



United States Thoroughfare, Landmark, and Postal Address Data Standard (Final Draft)

Standards Working Group
Federal Geographic Data Committee

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Federal Geographic Data Committee

Department of Agriculture • Department of Commerce • Department of Defense • Department of Energy
Department of Housing and Urban Development • Department of the Interior • Department of State
Department of Transportation • Environmental Protection Agency
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Federal Geographic Data Committee

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1. Introduction

1.1 ***The Need for a Comprehensive Address Data Standard***

Addresses are the location identifiers most widely used by the public and by state and local government. 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.

Local governments must record and locate every address within and around their jurisdictions. Local governments must ascertain the location of every address that appears anywhere in their administrative records--every residence, business, public structure, building permit, emergency response site, voter, school child, and public service client, including addresses where no one resides and no mail is received. In many places addresses are also used to identify infrastructure facilities, including bus stops, fire hydrants, utility poles and meters, cell phone towers, manholes, and signs.

To organize, maintain, and provide address records, local address authorities must create master address repositories that replace the numerous isolated, incomplete departmental address data files with one authoritative, integrated geographic address database. The construction of master address repositories is of paramount importance at the local level, because it permits departments to integrate address-related records, and ultimately operations, across department lines. The repository must include, not just the address itself, but its coordinate location, and documentation of where the address record originated and whether it is (or ever was) valid. To check validity and facilitate data maintenance, the repository must record the business rules by which addresses are assigned.

Emergency dispatchers in particular require accurate address locations. Emergency dispatchers must be able to route an emergency vehicle to any address in their response area, under circumstances when minutes matter. For emergency dispatchers, having well documented, standardized address data can mean the difference between life and death.

Many 911 callers use cell phones, which report the callers' coordinates, but not their addresses. Emergency dispatchers must then infer the address from the coordinates. Translation from the coordinates to addresses is thus of increasing importance for dispatchers and first responders.

The USPS, commercial delivery services, and direct mail firms, before sending anything or attempting delivery, must verify the delivery address by standardizing it and matching it against a standardized master address list. Together they have, over several decades, worked out specifications for standardizing addresses and formatting mailing labels. The specifications are published in USPS Publication 28, "Postal Addressing Standards." The USPS maintains the nationwide master list of mailing addresses. Maintenance is complicated by the general lack of any local authority for address updates.

Government agencies require unambiguous ways to exchange address data among different units of government, both at the local level, e.g., city to city, or city to county, and between different levels of government, e.g., from city or county to regional, state and federal agencies. The need is critical in times of emergency.

Finally, regional, state, and federal agencies (as well as private-sector firms) must aggregate local address files into state and national address lists. These include, most prominently, the USPS ZIP+4 and City State files, and Census Bureau MAF/TIGER files.

A comprehensive address data standard must serve the full range of these needs: postal delivery and census enumeration, local government administration and intergovernmental cooperation, emergency dispatch, the creation and administration of master address repositories by local address authorities, and the aggregation of local records into larger regional, state, and national address databases.

In sponsoring the creation of the United States Thoroughfare, Landmark, and Postal Address Data Standard, the Federal Geographic Data Committee (FGDC) has sought to convene, under the auspices of its Subcommittee on Cultural and Demographic Data, interested parties from among the local, state, Federal, and non-government sectors to resolve address data modeling and geoprocessing and to create a comprehensive address data standard, thereby helping to make our national spatial data infrastructure truly national.

1.2 Objective

The *United States Thoroughfare, Landmark, and Postal Address Data Standard* has been created to:

- Provide one standard that meets the diverse address data management requirements for local address administration, postal and package delivery, emergency response (and navigation generally), administrative recordkeeping, and address data aggregation.
- Support the use of best practices in address data management.
- Provide a systematic, consistent basis for recording all addresses in the United States.
- Define the elements needed to compose addresses and store them within relational databases and geographic information systems.
- Define the attributes needed for address documentation, mapping, and quality testing, including address ID's, coordinates, and linear reference locations.
- Provide a complete taxonomy (systematic classification) of US addresses that is useful to address data managers.
- Introduce the idea of the address reference system—the formal description of the local address assignment rules, both spatial and non-spatial—and define its elements and attributes, as a basis for address assignment and quality testing.
- Define tests and procedures for address data quality testing, error-trapping, and anomaly identification.
- Support seamless exchange of address information, and foster consistent implementation of this standard, by defining XML models for every address element, attribute, and class, integrated into a single XML Schema Document.

- Offer a migration path from legacy formats to standards-compliant ones.
- Recognize, as a practical matter, that different business purposes and different data sources will require different levels of complexity in address data records, files and repositories.
- Build on USPS Publication 28, the Census Bureau TIGER files, the FGDC Content Standard for Digital Geospatial Metadata, the FGDC's National Spatial Data Infrastructure (NSDI) Framework Data Content Standard, and previous FGDC address standard efforts.

1.3 Benefits

Address data management is central to a broad range of everyday government, non-profit, and business activities, at all levels of government and all scales of enterprise. An address data standard can simplify, strengthen, and streamline these activities by providing common terms, definitions, and data structures to:

- Compile and document address records and address data files.
- Support the creation of master address repositories by address authorities, and aggregation of local repositories into larger address registers.
- Support seamless, unambiguous exchange of address information within and between organizations.
- Reduce duplicate efforts for address data collection, verification, and correction.
- Foster organizational efficiencies by integration of activities that use address data within organizations.
- Make address data more consistent and more easily reusable across projects and disciplines.
- Simplify the development of information system applications that use address data.
- Improve the quality of address data by increasing the number of individuals who find and correct errors.

1.4 Scope

1.4.1 Subject and Area

The *United States Thoroughfare, Landmark, and Postal Address Data Standard* covers thoroughfare, landmark, and postal addresses within the United States, including its outlying territories and possessions.

1.4.2 Structure: One Standard, Four Parts

This standard has been developed in conformance with the FGDC Standards Reference Model for data standards. It provides, in four separate parts, a data content, classification, quality, and exchange standard for thoroughfare, landmark, and postal addresses, and for address reference systems:

- **Data Content** standards provide semantic definitions of a set of objects. In this standard, the content part specifies and defines the data elements that may appear in or describe street, landmark, and postal addresses, and address reference systems.
- **Data Classification** standards provide groups or categories of data that serve an application. In this standard, the classification part defines classes of addresses according to their syntax, that is, their data elements and the order in which the elements are arranged.
- **Data Quality** standards describe how to express the applicability or essence of a data set or data element and include data quality, assessment, accuracy, and reporting or documentation standards. In this standard, the Data Quality part specifies tests and measures of address data quality.
- **Data Exchange** standards describe how to produce or consume packages of data, independent of technology and applications, to facilitate moving data between agencies and systems. In this standard, the Data Exchange part provides a complete XML schema description for exchange of address data.

The *United States Thoroughfare, Landmark, and Postal Address Data Standard* is thus one standard, comprised of four parts: Address Data Content, Address Data Classification, Address Data Quality, and Address Data Exchange.

1.4.3 Definition of “Address”

This standard proposes a new definition of "address":

An address specifies a location by reference to a thoroughfare or a landmark; or it specifies a point of postal delivery.

This definition differentiates addressing from the two other types of spatial referencing systems, coordinate reference systems, and linear reference systems. The difference rests, not on what the systems locate, but on what they refer to in order to specify a location.

Coordinate reference systems specify location by reference to a grid, spheroid, or geoid (and a datum). Linear reference systems specify location by reference to a route (and a beginning point). Within the context of this standard, coordinates, and linear reference locations are treated as attributes of addresses, or, in the cases of certain postal delivery addresses, as inapplicable. This definition also excludes email and other computer system addresses.

This definition places address occupants and mail recipients (addressees) outside the scope of the standard. Many postal addressing standards include specifications for personal names, business names, and internal distribution points such as mailstops, particularly in the context of specifying formats for mailing labels. However, an addressee may have multiple addresses, and an address may have many occupants. For address data management, address and addressee should be treated as separate entities, and defined by separate standards.

1.4.4 Address Data Classification: A Syntactical Approach

The standard classifies addresses according to their syntax, that is, their address elements and the order in which the elements are arranged. Syntax determines the record structure

needed to hold and exchange an address, and often it is all that is known about the addresses in a given file.

Classifying addresses by syntax rather than semantics (i.e., meaning) allows the users of the standard to focus on record structures, and to avoid the need for any assumptions about what kind of feature the address might identify. Classifying addresses by feature can be frustrating or impossible because:

1. Reliable information about an address may be unavailable.
2. Often, one address is used to identify several types of features (e.g., parcel, building, building entrance, utility meter, utility pole, incident location, etc.) at the same location.
3. A set of feature categories may be found to be ambiguous or incomplete when applied to a given address.

The Address Data Classification part of the standard classifies all US addresses into a simple, complete taxonomy of ten US address classes. Consistent with the principles of the General Information Model defined in the FGDC Framework Data Content Standard Base Part, each particular address class is a subclass of an abstract Address Class. The ten address classes are organized into three groups, plus a catchall general class.

Thoroughfare Classes. Thoroughfare addresses specify a location by reference to a thoroughfare. A thoroughfare is defined as a "road or part of a road or other access route along which a delivery point can be accessed"(UPU Publication S42-4 (sec. 5.2.9)). A thoroughfare is typically but not always a road - it may be, for example, a walkway, a railroad, or a river. The thoroughfare address classes are:

1. Numbered Thoroughfare Address ("123 Main Street")
2. Intersection Address ("Fifth Avenue and Main Street")
3. Two Number Address Range ("405-411 West Green Street")
4. Four Number Address Range ("900-962, 901-963 Milton Street")
5. Unnumbered Thoroughfare Address ("Forest Service Road 698")

Landmark Classes. Landmark addresses specify a location by reference to a named landmark. A landmark is a relatively permanent feature of the manmade landscape that has recognizable identity within a particular cultural context" (definition adapted from U.S. Board on Geographic Names, 2003, p. 48).

1. Landmark Address ("Statue of Liberty")
2. Community Address ("123 Urbanizacion Los Olmos")

Postal Delivery Classes. Postal delivery addresses specify points of postal delivery that have no definite relation to the location of the recipient, such as a post office box, rural route box, overseas military address, or general delivery office. The USPS specifies each class in detail in USPS Publication 28.

1. USPS Postal Delivery Box ("PO Box 16953")
2. USPS Postal Delivery Route ("RR 1, Box 100")

3. USPS General Delivery Office ("General Delivery")

General Class. The General Address Class is for files that hold addresses from various classes, and for addresses (such as foreign addresses) that might not fit in any of the thoroughfare, landmark, or postal delivery classes.

1.4.5 Address Data Content: Elements

The Address Data Content part of the standard names and defines the simple and complex data elements needed to construct addresses, and for each one provides, among other information, its name, definition, data type, existing standards (if any), domain of values (if any), examples, and explanatory notes; XML tag, XML model, example, and notes; and data quality measures and notes. The elements are too numerous to list here, but they cover:

- Address numbers and their components
- Street names and their components
- Subaddresses (apartments, offices, suites, etc.) and their components
- Landmark names
- Larger areas (place names, states, ZIP Codes and Zip+4, and country names)
- USPS postal address elements (PO Boxes, rural routes, overseas military addresses, general delivery, etc.)
- USPS address lines (Delivery Line and Last Line, as specified in USPS Publication 28)

1.4.6 Address Data Content: Attributes for Documentation, Mapping and Quality Control

The Address Data Content part of the standard also defines a number of attributes needed for address documentation, mapping, and quality control. For each attribute, the standard provides the same information that is provided for the address elements. Collectively the attributes constitute record-level metadata for each address. The attributes are too numerous to list here completely, but key attributes include:

- A unique identifier for each different address, to serve as a primary key in an address database.
- Geographic coordinates and linear referencing locations.
- Lifecycle status (potential, proposed, active, retired).
- Address Class (in terms of the taxonomy described above).
- Address feature type (the type of feature located by the address, e.g., parcel, building, entrance, subaddress, infrastructure component, etc.).
- Official status (official, alias, unofficial, etc.).
- Related address identifier and type of relation (to relate, say, an alias address to its official address, or a landmark address to its equivalent thoroughfare address, or a parcel address to the tax billing address).

- The address authority responsible for the address, the dataset where it is found, and the dates the address was created and retired.
- Various attributes that describe specific address elements, such as address number parity, address range type, and place name type.

1.4.7 Address Reference System: The Local Framework for Address Assignment

The Address Data Content part of the standard introduces the concept of an address reference system and defines the elements needed to compose, describe, and document it. An address reference system is the framework of local rules, both spatial and non-spatial, by which new addresses are assigned and old ones checked within a specific area. It may include rules for naming streets and for assigning address numbers along them, as well as a boundary defining the area within which the rules apply. The address reference system, in turn, is important to data quality testing.

1.4.8 Address Data Quality: A Complete Suite of Data Quality Tests

The Address Data Quality part of the standard provides a complete suite of data quality tests for all address elements, attributes, and classes. These tests measure how well a given set of address records conforms to this standard and the local address reference system. The tests are developed in terms consistent with the FGDC's "Content Standard for Digital Geospatial Metadata" (FGDC 1998) and subsequent SDTS and ISO standards of spatial data quality. Each test specification includes the scope, measure, and procedure of the test; an SQL pseudocode script; and parameters for calculating anomalies as a percentage of the data set.

1.4.9 Address Data Exchange: XML Schema Document (XSD), XML, and UML

The Address Data Exchange part of the standard includes an XSD that describes the XML elements, attributes, and classes, and the rules for assembling them. It also includes a UML metamodel. The XSD provides complete, open, standard XML data exchange templates for both monolithic and transactional data exchanges. XML is well-suited for this purpose (and required by FGDC exchange standards), because it supports seamless exchange between different users, while allowing for local variations on either end.

The XSD conforms to the W3 C XML Core Working Group "Extensible Markup Language (XML) 1.0" (Third Edition, W3 C Recommendation 4 February 2004). Geometry elements are defined and implemented following OGC's "OpenGIS(R) Geography Markup Language (GML)" (Version: 3.1.1). These versions were chosen to provide consistency with the FGDC's Geographic Information Framework Data Content Standard. (See Appendix A for complete references.)

1.4.10 A Data Model, but Not a Database Model

The XSD defines an address data model. It states the rules for combining simple elements into complex elements, for composing addresses from simple and complex elements, and for using attributes to describe addresses and their elements.

However, the standard does not provide a database model with table structures or relationships. The standard does not prescribe one specific design for constructing complex elements from simple elements, or addresses from their complex and simple elements. It does not specify, for example, how to relate address numbers to street names, or compose a master street name list, or geocode addresses, even though these and other tasks are crucial to the creation and maintenance of an address database.

There are many ways to accomplish these tasks. The standard accommodates a range of different design choices in composing, relating, and describing elements and addresses. The best way depends on local circumstances, rules, customs, and anomalies - and therefore cannot be prescribed in a standard. Instead, these choices are left as implementation matters to be decided locally.

1.4.11 A Few Basic Statements on Implementing this Standard

An implementation guide is well beyond the scope of this standard, but a few things can be stated here:

1. The standard does not require parsing every address into its simplest elements, nor does it require creation of a complex, highly-normalized address data base. The standard recognizes and supports different levels of complexity, from the two-line format prescribed in USPS Publication 28 to a highly-parsed, fully-normalized database.
2. By the same principle, the standard does not require incorporation of every element and attribute. Only the Address ID is required for every address record. From among the others, select only those needed for the purpose at hand, and omit the rest. For example, if none of the addresses in a given area has any Address Number Prefixes, that element may be omitted from the address records for that area. In another example, the two-line USPS Publication 28 address format can be represented, if desired, by only two complex elements - or it can be composed from a more complex array of simple and complex elements.
3. The standard does not require use of most of the address attributes. However, the Address ID is required, and several other attributes are essential for most purposes.

These choices, and others, will be dictated by the specific purpose for which the standard is applied, and the specific data to which it is applied.

1.4.12 Abbreviations in Addresses

Abbreviations are frequently used in addresses, and in particular the USPS abbreviations for street name directionals and types are widely used. However, this standard recognizes only two specific groups of abbreviations, both of which are unambiguous and used without variation:

1. The two-letter abbreviations for the fifty states; the District of Columbia, US territories, possessions, and minor outlying islands; and USPS-designated overseas military and diplomatic "state" equivalents (AA, AE, AP)(see State Name element). These abbreviations may be used in the State Name Element, but the abbreviations are specifically prohibited in the Street Name Pre Type and Street Name Elements.

2. Nine USPS abbreviations defined for postal delivery purposes and having no direct relation to any location (PO Box, PMB; RR, HC; PSC, CMR; APO, FPO, and DPO)(see USPS Postal Delivery Box and USPS Postal Delivery Route address classes).

No other abbreviations are recognized within the standard, for three reasons:

1. The standard must serve a broad range of purposes, and no set of abbreviations is used for all those purposes. USPS abbreviations, for example, differ from emergency dispatch abbreviations and from other abbreviations in use.
2. Abbreviations can create ambiguity. As an example, consider “N W Jones Tr.” Is it “Northwest Jones Tr,” “Noble Wimberly Jones Tr,” or “North William Jones Tr”? Does Tr stand for Terrace, Trail, or Trace? Abbreviations lose information about the full address, and thereby hamper data quality testing and data exchange. Time saved in data entry is lost in checking ambiguous addresses.
3. Any list of standard abbreviations is bound to be incomplete. A few examples of street types missing from the most recent (2006) USPS list include: Alcove, Close, Connector, Downs, Exchange, and Promenade. In addition many applications such as 911 dispatch require specialized local abbreviations (e.g., “NCap” for North Capitol Street). Local abbreviations will not be clear to outsiders unless the complete form can be recovered from the master address record.

Therefore addresses should be stored unabbreviated in the master address record, and views or export routines should be used to meet the needs of E-911, mailing addresses, etc. If a link is preserved between the primary record and its recognized alternatives, abbreviations are unambiguously expandable when necessary -- as for instance when address information must be shared between two agencies that use different abbreviation rules.

This standard recognizes all USPS abbreviations and abbreviation rules within the Postal Addressing Profile. Additional profiles can be created if other needs warrant.

1.4.13 No Address Data Presentation Standard is Included

This standard does not specify how address data should be symbolized graphically or geographically. The appropriate representation depends on the purpose of the map creator, so no standard is warranted.

1.4.14 Language and Character Set

For English-language addresses, this standard can be implemented with the standard ASCII character set. To facilitate reproduction in the widest variety of media, the standard has been composed with the standard ASCII character set, even at the cost of simplifying the representation of certain non-English words. Other character sets, such as Unicode, are required to correctly represent addresses that use other languages. The character set should be specified in the file-level metadata for any address file.

1.5 Applicability

This standard is intended for use within and among federal, state, regional, local government agencies, nongovernmental sectors, and the general public.

1.6 Related Standards

This standard incorporates references to over 40 other standards and specifications. Appendix A (Informative) gives complete references to the standards and specifications cited, as well as to other standards and guidelines consulted in writing the standard.

This standard was written to conform to the *FGDC Standards Reference Model* (FGDC 1996). In the terms defined by that model, this standard is a data standard. Specifically, this standard has four parts: a data content standard (Part One), a data classification standard (Part Two), a data usability (Part Three), and a data transfer standard (Part Four). This standard does not include a data symbology or presentation standard.

This standard incorporates by reference, for address data files, the FGDC's *Content Standard for Digital Geospatial Metadata* (CSDGM) (FGDC 1998). This standard extends the CSDGM by providing attributes for record-level address metadata. These attributes overlap to some extent with the CSDGM. If the values of these attributes are the same for all records in an address data file, the information can be omitted from the individual records and provided in the file-level metadata. If the values vary from record to record (e.g., in a file aggregated from multiple sources), the attributes can be included in the record-level metadata.

This standard is consistent with all parts of the FGDC's *Framework Data Content Standard of the National Spatial Data Infrastructure*. In particular, it conforms to all provisions of the Base part of the Framework Standard, which defines the abstract model that underlies and unifies the seven data themes. Appendix J shows this in detail. The address standard can therefore be used in conjunction with all of the National Spatial Data Infrastructure data themes.

USPS Publication 28, *Postal Addressing Standards*, is a foundational work for the Content and Classification Parts of this standard. USPS Publication 28 is the basis for the United States profile of the template and rendition instructions in the Universal Postal Union International postal address components and templates (UPU 2008). The Postal Addressing Profile establishes the relationship between the FGDC standard and USPS Publication 28. The profile restricts this standard in some ways, and extends it in other ways, to incorporate the specific rules, abbreviations, and scope limitations of USPS Publication 28. Any address record that is standardized as defined within the terms of USPS Publication 28 is also compliant with the Postal Addressing Profile and, if altered according specific procedures described therein, will conform to this standard.

This standard explicitly incorporates, as the Four Number Address Range class, the TIGER/Line file structure established by the U.S. Census Bureau for street segment address ranges (U.S. Census Bureau 2008).

During the time this standard has been developed, the National Emergency Number Association (NENA) has developed the Next Generation 9-1-1 (NG9-1-1) Civic Location Data Exchange Format (CLDXF) Standard to support the exchange of United States civic location address information about 9-1-1 calls. The CLDXF is the United States profile of the Internet Engineering Task Force (IETF) Presence Information Data Format – Location Object (PIDF-LO) civicAddress type. The FGDC and NENA working groups have aligned the two standards as closely as possible within the constraints of their

respective purposes. To clarify the relation between the two standards, and to facilitate and standardize the conversion of address records between FGDC conformance and CLDXF conformance, the two committees have written the *Profile Reconciling the FGDC United States Thoroughfare, Landmark, and Postal Address Data Standard and the NENA Next Generation 9-1-1 (NG9-1-1) Civic Location Data Exchange Format (CLDXF) Standard*.

The pseudocode for the data quality tests was written (with a few exceptions, all noted) using standard ISO/IEC 9075-1:2008 SQL. Spatial predicates used in the pseudocode are described in OGC's "OpenGIS Simple Features Specification for SQL" (Rev 1.1).

The XSD conforms to the W3 C XML Core Working Group "Extensible Markup Language (XML) 1.0" (Third Edition, W3 C Recommendation 4 February 2004). Geometry elements are defined and implemented following OGC's. "OpenGIS(R) Geography Markup Language (GML)" (Version: 3.1.1).

1.7 Standards development procedures

1.7.1 Antecedents

This standard builds on the Address Data Content Standard previously proposed by the FGDC (Public Review Draft, April 17, 2003).

1.7.2 The Address Standard Working Group (ASWG)

The FGDC efforts 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. Census Bureau, the convening of an Address Standard Working Group (ASWG) 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 ASWG has worked under the authority of the Census Bureau, which chairs the FGDC Subcommittee on Cultural and Demographic Data (SCDD).

The ASWG prepared a draft standard, which was posted for public comment in August-September of 2005. A second draft was posted for public comment in December 2005 and January 2006. Since then, the ASWG has developed the standard further, by responding to additional comments and conference discussions, drafting additional material, integrating related standards, and preparing the final version for submittal to the FGDC.

1.7.3 Standard Development Process

Because addresses are created by such decentralized processes, and because the standard must satisfy such a wide range of requirements, the ASWG has sought by a variety of means to make the development process as open and broad-based as possible. This has involved:

Fostering Broad Awareness and Participation. The ASWG has sought by various means to make the geospatial and addressing communities aware of the development of the standard and to involve as many as possible in the effort. The ASWG invited participation from and via professional associations representing geospatial professionals, local government officials, and emergency responders, including the National

Association of Counties (NACO), GITA (Geospatial Information Technology Association), the American Association of Geographers (AAG), URISA, NSGIC (National States Geographic Information Council), and NENA (National Emergency Number Association). The draft standards, when posted, were widely announced in the geospatial and standards online media. ASWG members have made numerous presentations on the standard at conferences and meetings. In addition, the ASWG has regularly briefed various federal groups, especially the FGDC and Census, about progress on the standard.

Using a Wiki Collaborative Website. To encourage wide participation, the ASWG set up an interactive wiki website using free and open-source software (TWiki, from <http://twiki.org/>). Wiki software posts a draft document (in this case, the working draft of the standard) on a server and enables anyone to edit or comment on it via internet. Comments and changes, once saved, are immediately visible to all. Anyone can add comments and ideas, or join in discussions of various aspects of the standard.

The ASWG wiki site was open to anyone providing a name and a valid email to which to send a password. (The site is password protected only to keep out spam.) Over 400 individuals signed up to view the site, provide comments, enter discussions, and participate in the development of the standard. The wiki site fostered discussion among widely scattered individuals, and proved useful in obtaining information and debating points of concept, practice, and actual address conditions.

Posting Drafts for Public Comment via Webform. The ASWG posted a first draft on the standard two months after starting work, in the summer of 2005. It was posted on the URISA website, with copies available for download, and all comments were submitted via webform so that as many people as possible had access. Over 125 comments were received on this draft. A second draft was posted in December 2005, which received over 180 comments. The Committee has since made significant revisions to incorporate these comments, and to respond to issues that they raised.

Focusing on Practical Needs and Usefulness. The ASWG's purpose has been to create a standard that will be useful and used. To be useful, the standard must reflect and build on the processes of address creation, management, and use. The standard must be developed by people who understand the local business workflows that utilize addresses in a real-time environment. Therefore the ASWG has sought advice and comment from a wide range of practitioners, including, among others, local government GIS managers, planners, assessors, emergency responders, school district officials, election officials, software developers, data aggregators, postal officials, census geographers, and a newspaper delivery manager, to name a few.

1.8 Maintenance authority

The Census Bureau will maintain the standard under the auspices 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. Direct any questions to Chief, Geography Division, U.S. Census Bureau.

1.9 Acronyms Used in the Standard

AIS - Address Information System (USPS)
ALI - Automatic Location Information
ANSI - American National Standards Institute
APO - Army Post Office
ASWG - Address Standard Working Group
CASS - Coding Accuracy Support System (USPS)
CLDXF - Civic Location Data Exchange Format (NENA NG9-1-1 CLDXF)
CMR - Common Mail Room
CMRA - Commercial Mail Receiving Agency
CRS - Coordinate Reference System
CSDGM - Content Standard for Digital Geospatial Metadata (FGDC)
DMM - Domestic Mail Manual (USPS)
DPO - Diplomatic Post Office
EPSG Dataset - European Petroleum Survey Group Geodetic Parameter Dataset (OGP)
EPA - Environmental Protection Agency
ERD - Entity Relationship Diagram
FGDC - Federal Geographic Data Committee
FIPS - Federal Information Processing Standard
FPO - Field Post Office, or Fleet Post Office
GIS - Geographic Information System
GML - Geography Markup Language (OGC)
GNIS - Geographic Names Information System
GPS - Global Positioning System
GZD - Grid Zone Designation
HC - Contract Delivery Service Route (formerly Highway Contract Route, and still abbreviated as HC)(USPS)
ID or Id - Identifier
IETF - Internet Engineering Task Force
INCITS L1- InterNational Committee for Information Technology Standards Technical Committee L1 (Geographic Information Systems) (accredited by ANSI)
ISO - International Standards Organization
ITU-T - International Telecommunications Union Telecommunication Standardization Sector
LRM - Linear Reference Method
LRS - Linear Reference System
MAF - Master Address File (Census Bureau)
MSAG - Master Street Address Guide
MGRS - Military Grid Reference System
NAD83 - North American Datum of 1983
NCITS - National Committee for Information Technology Standards
NENA - National Emergency Number Association
NFIRS - National Fire Incident Reporting System
NG9-1-1 - Next-Generation 9-1-1
NIST - National Institute of Standards and Technology
NSDI - National Spatial Data Infrastructure
PIDF-LO - Presence Information Data Format - Location Object (IETF)

OGC - Open Geospatial Consortium
OGP - International Association of Oil and Gas Producers (the OGP Geodesy Subcommittee maintains and publishes EPSG Dataset)
PMB - Private Mail Box
PO Box - Post Office Box
PSC - Postal Service Center
RFC - Request for Comments (IETF)
RR - Rural Route (USPS)
SCDD - FGDC Subcommittee on Cultural and Demographic Data
SDTS - Spatial Data Transfer Standard (FGDC and USGS)
SWG - FGDC Standards Working Group
TIGER - Topologically Integrated Geographic Encoding and Referencing System (Census Bureau)
UML - Unified Modeling Language
UPU - Universal Postal Union
URISA - Urban and Regional Information Systems Association
USGS - United States Geological Survey
USNG - United States National Grid
USPS - United States Postal Service
UTM - Universal Transverse Mercator
UUID - Universally Unique Identifier
XML - Extensible Markup Language
XSD - XML Schema Document
ZIP Code - Zoning Improvement Plan Code (USPS)

1.10 Trademark Acknowledgements

The following trademarks are owned by the United States Postal Service: CASS™, PO Box™, U.S. Postal Service®, United States Post Office®, United States Postal Service®, USPS®, ZIP + 4®, ZIP Code™, ZIP™

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2. Part 1: Address Data Content

2.1 Introduction

2.1.1 Purpose

The content part defines address elements, their attributes, and address reference system elements.

2.1.2 Organization

The address elements are presented first, grouped according to the major components of an address, followed by the attributes, which are grouped by subject, and lastly the address reference system elements. The Table Of Elements And Attributes immediately following this introduction lists elements and attributes in the order they are presented.

2.1.3 Simple Elements, Complex Elements, and Attributes

The content part defines simple elements, complex elements, and attributes.

1. Simple elements are address components or address reference system components that are defined independently of all other elements
2. Complex elements are formed from two or more simple or other complex elements
3. Attributes provide descriptive information, including geospatial information, about an address, an address reference system, or a specific element thereof.

Appendix B: Table of Element Relationships lists the relations between simple and complex elements.

2.1.4 Element and Attribute Definitions and Descriptions

Each data element is defined and described by giving its:

1. **Element name:** The name of the element.
2. **Other common names for this element:** Common words or phrases having the same or similar meaning as the element name. Note:

"(USPS)" indicates terms used in USPS Publication 28.

"(Census TIGER)" indicates terms found in U.S. Census Bureau TIGER\Line Shapefile documentation.

* Appendix A gives complete citations for both documents.

1. **Definition:** The meaning of the element.
2. **Syntax:** (For complex elements only) What component elements are required or permitted to construct the element, and the order in which they must appear. (For syntax notation, see below, "Notation for Constructing Complex Elements").
3. **Definition Source:** The source of the definition ("New" indicates that the definition is original).
4. **Data Type:** Whether the element is a characterString, date, dateTime, integer, real, or geometric (point, MultiCurve, or MultiSurface) (see "Element and Attribute Data Types" below for definitions).
5. **Existing Standards for this Element:** Other standards that govern this element (if any).
6. **Domain of Values for this Element:** The range or set of values (if any) to which the element is restricted.
7. **Source of Values:** The source (if any) for the domain of values.
8. **How Defined:** How the domain of values is defined.
9. **Example:** Illustrative examples of the element.
10. **Notes/Comments:** Notes and comments giving further explanation about the element.

11. **XML Tag:** The XML tag for the element.
12. **XML Model:** XML model of the element.
13. **XML Example:** The XML model applied to a specific example of the element.
14. **XML Notes:** Explanatory notes about the XML model.
15. **Quality Measures:** Quality tests applied to the class.
16. **Quality Notes:** Explanatory notes about the quality measures applied to this element.

2.1.5 Element and Attribute Data Types

Elements and attributes are either non-geometric, geometric, or abstract. Non-geometric data types include characterString, date, dateTime, integer, and real. Geometric data types include point, MultiCurve, and MultiSurface. The abstract data type, as used in this standard, aggregates multiple elements of different data types, geometric and non-geometric.

The non-geometric data types are defined in the FGDC's "Framework Data Content Standard Part 0: Base Document" (section 7.8.2.2 (Table 4 - CodeList for DataType)) as follows:

1. **characterString:** "A CharacterString is an arbitrary-length sequence of characters including accents and special characters from repertoire of one of the adopted character sets"
2. **date:** "Values for year, month, and day"
3. **dateTime:** "A combination of year, month, and day and hour, minute, and second"
4. **integer:** "Any member of the set of positive whole numbers, negative whole numbers and zero"
5. **real:** "Real numbers are all numbers that can be written as a possibly never repeating decimal fraction"

The geometric data types are defined in the Open Geospatial Consortium's "OpenGIS(R) Geography Markup Language (GML)" version 3.1.1 (see Appendix A for a complete citation):

1. **Point:** "...a single coordinate tuple." (Sec. 10.3.1)
2. **MultiCurve:** "...a list of curves. The order of the elements is significant and shall be preserved..." (Sec. 11.3.3.1). (The MultiCurve replaced the MultiLinestring datatype defined in GML version 3.0)
3. **MultiSurface:** "...a list of surfaces. The order of the elements is significant and shall be preserved..." (Sec 11.3.4.1). (The MultiSurface replaced the MultiPolygon datatype defined in GML version 3.0)

The abstract data type is defined in the FGDC's "Framework Data Content Standard Part 0: Base Document" (Annex B.2.2) as a "class, or other classifier, that cannot be directly instantiated." The abstract data type (used in this standard for the complex element Address Reference System) may aggregate multiple elements of different data types, geometric and non-geometric.

2.1.6 Notation for Constructing Complex Elements

The following notation is used to show how complex elements are constructed from simple or other complex elements:

{ } enclose the name of an element.

* indicates that the element is **required** to create the complex element. Otherwise the element may be omitted when desired.

+ indicates "and" (concatenation), with a space implied between each component unless stated otherwise.

2.1.7 XML and GML Standard

XML models and examples conform to the W3 C XML Core Working Group's "Extensible Markup Language (XML) 1.0" (see Appendix A for a complete citation). Geometry elements are defined and implemented following OGC's. "OpenGIS(R) Geography Markup Language (GML)" (Version: 3.1.1).

2.1.7.1 Table of Elements and Attributes

Category Group	Element Name	Simple/ Complex	Definition
Address Elements			
Address Number Elements			
	Address Number Prefix	S	The portion of the Complete Address Number that precedes the Address Number itself.
	Address Number	S	The numeric identifier for a land parcel, house, building, or other location along a thoroughfare or within a community.
	Address Number Suffix	S	The portion of the Complete Address Number that follows the Address Number itself.
	Separator Element	S	A symbol, word, or phrase used as a separator between components of a complex element or class. The separator is required for Intersection Addresses and for Two Number Address Ranges, and it may be used in constructing a Complete Street Name.
	Complete Address Number	C	An Address Number, alone or with an Address Number Prefix and/or Address Number Suffix, which identifies a location along a thoroughfare or within a community.
Street Name Elements			
	Street Name Pre Modifier	S	A word or phrase in a Complete Street Name that 1. Precedes and modifies the Street Name, but is separated from it by a Street Name Pre Type or a Street Name Pre

Category Group	Element Name	Simple/ Complex	Definition
			Directional or both, or 2. Is placed outside the Street Name so that the Street Name can be used in creating a sorted (alphabetical or alphanumeric) list of street names.
	Street Name Predirectional	S	A word preceding the street name that indicates the directional taken by the thoroughfare from an arbitrary starting point, or the sector where it is located.
	Street Name Pretype	S	A word or phrase that precedes the Street Name and identifies a type of thoroughfare in a Complete Street Name.
	Street Name	S	The portion of the Complete Street Name that identifies the particular thoroughfare (as opposed to the Street Name Pre Modifier, Street Name Post Modifier, Street Name Pre Directional, Street Name Post Directional, Street Name Pre Type, Street Name Post Type, and Separator Element (if any) in the Complete Street Name.)
	Street Name Posttype	S	A word or phrase that follows the Street Name and identifies a type of thoroughfare in a Complete Street Name.
	Street Name Postdirectional	S	A word following the street name that indicates the directional taken by the thoroughfare from an arbitrary starting point, or the sector where it is located.
	Street Name Post Modifier	S	A word or phrase in a Complete Street Name that follows and modifies the Street Name, but is separated from it by a Street Name Post Type or a Street Name Post Directional or both.
	Complete Street Name	C	Official name of a street as assigned by a governing authority, or an alternate (alias) name that is used and recognized.
	Corner Of	S	A directional word describing a corner formed by the intersection of two thoroughfares.
Subaddress Elements			
	Subaddress Type	S	The type of subaddress to which the associated Subaddress Identifier applies. (In the examples, Building, Wing, Floor, etc. are types to which the Identifier refers.) See Complete Subaddress for a definition of "subaddress."

Category Group	Element Name	Simple/Complex	Definition
	Subaddress Identifier	S	The letters, numbers, words, or combination thereof used to distinguish different subaddresses of the same type when several occur within the same feature. See Complete Subaddress for a definition of "subaddress."
	Subaddress Element	C	A single combination of Subaddress Type and Subaddress Identifier (or, in some cases, a Subaddress Identifier alone), which, alone or in combination with other Subaddress Elements, distinguishes one subaddress within or between structures from another when several occur within the same feature. See Complete Subaddress for a definition of "subaddress."
	Complete Subaddress	C	One or more Subaddress Elements that identify a subaddress within an addressed feature. A subaddress is a separate, identifiable portion of a feature, the whole of which is identified by a: --- Complete Address Number and Complete Street Name (in the case of a Numbered Thoroughfare Address) --- Complete Street Name (in the case of an Unnumbered Thoroughfare Address) --- Complete Landmark Name (in the case of a Landmark Address) --- Complete Address Number and Complete Landmark Name or Complete Place Name (in the case of a Community Address) --- USPS Box or USPS Address (in the case of an USPS Postal Delivery Box or USPS Postal Delivery Route address; for these classes, PMB (private mail box) is the only Subaddress Type permitted.)
Landmark Name Elements			
	Landmark Name	S	The name of a relatively permanent feature of the manmade landscape that has recognizable identity within a particular cultural context.
	Complete Landmark Name	C	One or more Landmark Names which identify a relatively permanent feature of the manmade landscape that has recognizable identity within a particular cultural context.
Place, State, and Country Name Elements			
	Place Name	S	The name of an area, sector, or development (such as a neighborhood or subdivision in a

Category Group	Element Name	Simple/Complex	Definition
			city, or a rural settlement in unincorporated area); incorporated municipality or other general-purpose local governmental unit; county or county-equivalent; or region within which the address is physically located; or the name given by the U.S. Postal Service to the post office from which mail is delivered to the address.
	Complete Place Name	C	One or more Place Names which identify an area, sector, or development (such as a neighborhood or subdivision in a city, or a rural settlement in unincorporated area); incorporated municipality or other general-purpose local governmental unit; county; or region within which the address is physically located; or the name given by the U.S. Postal Service to the post office from which mail is delivered to the address.
	State Name	S	The names of the US states and state equivalents: the fifty US states, the District of Columbia, and all U.S. territories and outlying possessions. A state (or equivalent) is "a primary governmental division of the United States." The names may be spelled out in full or represented by their two-letter USPS or ANSI abbreviation.
	ZIP Code	S	A system of 5-digit codes that identifies the individual Post Office or metropolitan area delivery station associated with an address.
	ZIP Plus 4	S	A 4-digit extension of the 5-digit Zip Code (preceded by a hyphen) that, in conjunction with the Zip Code, identifies a specific range of USPS delivery addresses.
	Country Name	S	The name of the country in which the address is located. A country is "an independent, self-governing, political entity."
USPS Postal Address Elements			
	USPS Box Type	S	The name of the class of the container used for receipt of USPS mail. USPS Publication 28 requires the use of "PO Box" or "Box" for this element.
	USPS Box ID	S	The numbers or letters distinguishing one box from another within a post office or route.
	USPS Box	C	A container for the receipt of USPS mail

Category Group	Element Name	Simple/ Complex	Definition
	USPS Box Group Type	S	uniquely identified by the combination of a USPS Box Type and a USPS Box ID.
	USPS Box Group ID	S	A name for a type of postal delivery point or route containing a group of USPS Boxes.
	USPS Route	C	The numbers or letters distinguishing one route or distribution point from another route or distribution point of the same USPS Box Group Type.
	USPS Address	C	A collection of boxes served from a single distribution point, and uniquely identified by a USPS Box Group Type and a USPS Box Group ID.
	USPS General Delivery Point	S	A USPS postal delivery point identified by a USPS Route and a USPS Box
	USPS General Delivery Point	S	A central point where mail may be picked up by the addressee. Two values are permitted: "General Delivery" (for post offices), and ship's names (for overseas military addresses).
USPS Address Lines			
	Delivery Address	C	The entire address, unparsed, except for the Place Name, State Name, Zip Code, Zip Plus 4, Country Name, and, optionally, Complete Subaddress elements.
	Place State ZIP	C	The combination of Complete Place Name, State Name, Zip Code, Zip Plus 4, and Country Name within an address. Complete Place Name and State Name are mandatory; the other elements are optional.
Attributes			
Address ID			
	Address ID	S	The unique identification number assigned to an address by the addressing authority
	Address Authority	S	The name of the authority (e.g., municipality, county) that created or has jurisdiction over the creation, alteration, or retirement of an address
	Related Address ID	S	The identifier of an address that is related to the identifier of another address.
	Address Relation Type	S	The manner in which an address identified by a Related Address ID is related to an address identified by an Address ID.
Address Coordinates			
	Address X	S	The X coordinate of the address location.

Category Group	Element Name	Simple/Complex	Definition
	Coordinate		
	Address Y Coordinate	S	The Y coordinate of the address location.
	Address Longitude	S	The longitude of the address location, in decimal degrees.
	Address Latitude	S	The latitude of the address location, in decimal degrees.
	US National Grid Coordinate	S	<p>The USNG is an alphanumeric point reference system that overlays the Universal Transverse Mercator (UTM) numerical coordinate system.</p> <p>A USNG coordinate consists of three parts, the:</p> <ol style="list-style-type: none"> 1. Grid Zone Designation (GZD) for worldwide unique geocodes (two digits plus one letter, developed from the UTM system). 2. 100,000-meter Square Identification for regional areas (two letters). 3. Grid Coordinates for local areas (always an even number of digits between 2 and 10 depending upon precision).
	Address Elevation	S	Distance of the address in specified units above or below a vertical datum, as defined by a specified coordinate reference system.
	Address Coordinate Reference System ID	S	<p>A name or number which, along with the Address Coordinate Reference System Authority, identifies the coordinate reference system to which Address X Coordinate and Address Y Coordinate, Address Latitude and Address Longitude, US National Grid Coordinate, or Address Elevation values are referenced.</p>
	Address Coordinate Reference System Authority	S	<p>The Authority that assigns the unique Address Coordinate Reference System ID (number or name) to the Address Coordinate Reference System to which the Address X Coordinate and Address Y Coordinate, Address Latitude and Address Longitude, US National Grid Coordinate, or Address Elevation are referenced.</p>
	Address Coordinate Reference System	C	{ Address Coordinate Reference System Authority* } + { Address Coordinate Reference System ID* }

Category Group	Element Name	Simple/Complex	Definition
Address Parcel IDs			
	Address	S	The permanent identifier for the agency, organization, or jurisdiction that assigns and maintains the Address Parcel Identifier.
	Parcel Identifier		
	Source		
	Address	S	The primary permanent identifier, as defined by the Address Parcel Identifier Source, for a parcel that includes the land or feature identified by an address. A parcel is "a single cadastral unit, which is the spatial extent of the past, present, and future rights and interests in real property."
Address Transportation Feature IDS			
	Address	S	The name of the transportation base model to which the address is related.
	Transportation System Name		
	Address	S	The authority that maintains the transportation base model specified by the Address Transportation System Name, and assigns Address Transportation Feature IDs to the features it represents.
	Transportation System Authority		
	Address	S	The type of transportation feature (TranFeature) used to represent an address.
	Transportation Feature Type		
	Address	S	The unique identifier assigned to the particular feature that represents an address within a transportation base model.
	Transportation Feature ID		
	Related	S	The unique identifier assigned (within the reference transportation base model) to a transportation feature to which an address is related.
	Transportation Feature ID		
Address Range Attributes			
	Address Range Type	S	This attribute states whether an address range (either a Two Number Address Range or a Four Number Address Range) is actual or potential. Actual range: the low and high Complete Address Numbers are numbers that have been assigned and are in use along the addressed feature. Potential range: the low and high Complete Address Numbers are numbers that would be assigned if all possible numbers were in use along the addressed feature, and there were

Category Group	Element Name	Simple/Complex	Definition
			no gaps between the range and its preceding and following ranges.
	Address Range Parity	S	The set of Address Number Parity values specified in the Address Reference System Numbering Rules for the Address Numbers in an address range.
	Address Range Side	S	The side of a transportation segment (TranSeg) on which the address range is found (right, left or both).
	Address Range Directionality	S	Whether the low Complete Address Number of an address range is closer to the from-node or the to-node of the transportation segment(s) that the range is related to.
	Address Range Span	S	Whether an address range covers part of a transportation segment, one segment, multiple segments, or the entire thoroughfare within the Address Reference System Extent.
Address Attributes			
	Address Classification	S	The class of the address as defined in the Classification Part of this standard.
	Address Feature Type	S	A category of real world phenomena with common properties whose location is specified by an address.
	Address Lifecycle Status	S	The lifecycle status of the address.
	Official Status	S	Whether the address, street name, landmark name, or place name is as given by the official addressing authority (official), or an alternate or alias (official or unofficial), or a verified error.
	Address Anomaly Status	S	A status flag, or an explanatory note, for an address that is not correct according to the Address Reference System that governs it, but is nonetheless a valid address.
	Address Side of Street	S	The side of the transportation segment (right, left, both, none, unknown) on which the address is located.
	Address Z Level	S	Floor or level of the structure
	Location Description	S	A text description providing more detail on how to identify or find the addressed feature.
	Mailable Address	S	Identifies whether an address receives USPS mail delivery (that is, the address is

Category Group	Element Name	Simple/Complex	Definition
			occupable, and the USPS provides on-premises USPS mail delivery to it).
Element Attributes			
	Address Number	S	The property of an Address Number with respect to being odd or even.
	Parity		
	Attached Element	S	This attribute identifies when two or more Complete Address Number elements or two or more Complete Street Name elements have been combined without a space separating them.
	Subaddress Component Order	S	The order in which Subaddress Type and Subaddress Identifier appear within an Subaddress Element
	Element Sequence Number	S	The order in which the Subaddress Elements should be written within a Complete Subaddress; the order in which the Landmark Names should be written within a Complete Landmark Name; or the order in which the Place Names should be written within a Complete Place Name.
	Place Name Type	S	The type of Place Name used in an Address
	GNIS Feature ID	S	"A permanent, unique number assigned to a geographic feature for the sole purpose of uniquely identifying that feature as a record in any information system database, dataset, file, or document and for distinguishing it from all other feature records so identified. The number is assigned sequentially (highest existing number plus one) to new records as they are created in the Geographic Names Information System."
	ANSI State County Code	S	A set of two-digit numeric codes identifying the states, the District of Columbia, Puerto Rico, and the insular areas of the United States, which may be followed by a three-digit numeric code identifying a county or equivalent entity therein.
	Delivery Address Type	S	Whether the Delivery Address includes or excludes the Complete Subaddress.
Address Lineage Attributes			
	Address Start Date	S	The earliest date on which the address is known to exist.

Category Group	Element Name	Simple/Complex	Definition
	Address End Date	S	The date on which the address is known to no longer be valid.
	Data Set ID	S	An identifier in each record of a transmitted dataset, assigned by the sender or the receiver of the dataset, to link each record of the dataset to the file-level metadata that accompanies the dataset.
	Address Direct Source	S	Source from which the data provider obtained the address, or with which the data provider validated the address.
Address Reference System Elements			
	Address Reference System ID	S	A unique identifier of the Address Reference System for a specified area (Address Reference System Extent).
	Address Reference System Name	S	The name of the address system used in a specified area (Address Reference System Extent).
	Address Reference System Authority	S	The name of the authority or jurisdiction responsible for the creation and/or maintenance of an Address Reference System for a given area.
	Address Reference System Extent	S	Boundary of the area(s) within which an Address Reference System is used.
	Address Reference System Type	S	The category of address reference system in use. The type of reference system determines and guides the assignment of numbers within the Address Reference System Extent.
	Address Reference System Rules	C	The rules by which address numbers, street names and other components of a thoroughfare address are determined.
	Address Reference System Block Rules	S	This element defines a block in an Address Reference System, and sets forth the rules for block ranges and block breaks.
	Address Reference System Numbering Rules	S	The rules for numbering along a thoroughfare, including parity (odd/even side definition), and numbering increment distance and value.
	Address Reference System Street	S	The rules for the selection and use of street names within an Address Reference System

Category Group	Element Name	Simple/Complex	Definition
	Naming Rules		
	Address Reference System Street Type	S	Rules pertaining to the use of street types (suffix and prefix), directionals (prefix and suffix), and modifiers (prefix and suffix) of street names.
	Directional and Modifier Rules		
	Address Reference System Place name State Country and ZIP Code Rules	S	This element contains rules for the use of place names, state names, country names, and ZIP Codes within the jurisdiction of an Address Authority.
	Address Reference System Subaddress Rules	S	The rules that are applied to the addressing of areas within structures as subaddresses (units, suites, apartments, spaces, etc.) within a given Address Reference System
	Address Reference System Axis	S	The line that defines the points of origin for address numbering along thoroughfares that intersect it, or which are numbered in parallel to streets that intersect it. It may be a road, another geographic feature, or an imaginary line.
	Address Reference System Axis Point of Beginning	S	Coordinate location of the beginning point of address numbering along an Address Reference System Axis.
	Address Reference System Grid Angle	S	The degree to which a specific, named address grid is tilted off a north/south or east/west orientation.
	Address Reference System Reference Polyline	S	A street, geometric line, or other line used to measure address number assignment intervals and ranges within an Address Reference System. The Address Reference System Reference Polyline may consist of a beginning point, one or more segments of a street centerline, geographically identified line, such as a line of latitude or longitude, a

Category Group	Element Name	Simple/Complex	Definition
			land-division based line, such as a township, range, or section line, or an imaginary line constructed for the purpose of allocating address ranges and address numbers.
	Address Reference System Range Breakpoint	S	A point along a street or other thoroughfare within an Address Reference System where an address range beginning and/or endpoint is located.
	Address Reference System Range Breakline	S	A line connecting the Address Reference System Range Breakpoints with the same value within an Address Reference System
	Address Reference System Range Polygon	S	A polygon created by connecting the Address Reference System Range Breaklines with the same value within an Address Reference System
	Address Reference System Reference Document Citation	S	A bibliographic reference to an ordinance, map, manual, or other document in which the rules governing an Address Reference System are written.
	Address Reference System	C	An Address Reference System is a set of rules and geometries that define how addresses are assigned along thoroughfares and/or within a given area (Address Reference System Extent). At minimum, an Address Reference System must specify where Complete Address Number sequences begin and how Complete Address Numbers are assigned along the length of thoroughfares governed by the Address Reference System within the Address Reference System Extent. Address Reference Systems typically provide rules governing left-right parity of Complete Address Numbers, assignment of Street Names and street types, use of directionals and quadrants, and other aspects of address assignment. An Address Reference System that is based on axis lines, an Address Reference System Axis

Category Group	Element Name	Simple/ Complex	Definition
			defined for each axis used to define address assignment. Each Address Reference System Axis must have an identified Address Reference System Axis Point Of Beginning. An Address Reference System is known by its Address Reference System Name (required). Additional business rules for an Address Reference System are described in the Address Reference System Rules.

2.2 *Address Elements*

2.2.1 Address Number Elements

2.2.1.1 Address Number Prefix

Element Name	AddressNumberPrefix
Other common names for this element	Street Number Prefix, Building Number Prefix, House Number Prefix, Site Number Prefix, Structure Number Prefix
Definition	The portion of the Complete Address Number, which precedes the Address Number itself.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Can be created locally from existing values
Source of Values	Local
How Defined	Locally
Example	N6W2 3001 Bluemound Road A 19 Calle 11 194- 03 Fiftieth Avenue Milepost 1303 Alaska Highway
Notes/Comments	1. This element is not found in most Complete Address Numbers.

	<p>When found, it should be separated from the Address Number so that the Address Number can be maintained as an integer for sorting and quality control tests.</p> <ol style="list-style-type: none"> 2. Informally an Address Number and Address Number Prefix may be written with or without a space between them. Within this standard, the default assumption is that an empty space separates elements unless stated otherwise. The Attached Element can be used to indicate where the assumed space between the Address Number and Address Number Prefix has been omitted within an address file (see Attached Element for additional notes). 3. If a hyphen appears between an Address Number Prefix and an Address Number, the hyphen is included in the Address Number Prefix. 4. Milepost numbers are often used to specify locations on limited-access roads such as interstate highways, and along highways and country roads where addressable features are too sparse to assign address numbers. Where it is useful to treat these as addresses, treat "Milepost" (or "Kilometer", in Puerto Rico) as an Address Number Prefix, and the milepost number as the Address Number.
XML Tag	< AddressNumberPrefix >
XML Model	<pre><xsd:complexType name="AddressNumberPrefix_type"> <xsd:simpleContent> <xsd:extension base="xsd:string"> <xsd:attribute name="Separator" type="addr_type:Separator_type" /> </xsd:extension> </xsd:simpleContent> </xsd:complexType></pre>
XML Example	<pre><CompleteAddressNumber> <AddressNumberPrefix Separator="">N6W2</AddressNumberPrefix> <AddressNumber>3001</AddressNumber> </CompleteAddressNumber> <CompleteAddressNumber> <AddressNumberPrefix Separator="">A</AddressNumberPrefix> <AddressNumber>19</AddressNumber> </CompleteAddressNumber></pre>
Quality Measures	AddressNumberFishbonesMeasure RangeDomainMeasure

	SpatialDomainMeasure TabularDomainMeasure
Quality Notes	Address number prefixes can include map-based information as grid coordinates, references to survey systems or references to sections of a subdivision or housing complex. Where a tabular domain of values are available the prefix can be tested against it. The measure chosen will depend on the type of domain involved. See the introduction to this section for a information on which measures to use.

2.2.1.2 Address Number

Element Name	ADDRstandard.AddressNumber
Other common names for this element	Street Number, Building Number, House Number, Site Number, Structure Number
Definition	The numeric identifier for a land parcel, house, building or other location along a thoroughfare or within a community.
Definition Source	New
Data Type	Integer
Existing Standards for this Element	None
Domain of Values for this Element	Can be created locally.
Source of Values	Local jurisdiction
Attributes Associated with this Element	Address Number Parity
How Defined	Based on local address ranges associated with individual streets and blocks.
Example	123 Main Street
Notes/Comments	1. The Address Number is defined as an integer to support address sorting, parity (even/odd) definition, and in/out of address range tests.

	<ol style="list-style-type: none">2. The Address Number must be converted to a characterString when it is combined with the prefix and suffix into a Complete Address Number.3. Some addresses may contain letters, fractions, hyphens, decimals, and other non-integer content within the Complete Address Number. Those non-integer elements should be placed in the Address Number Prefix if they appear before the Address Number, or in the Address Number Suffix if they follow the Address Number. For example, if the New York City hyphenated address 194-03 ½ 50th Avenue, New York, NY 11365 were to be parsed rather than represented as a Complete Address Number:<ul style="list-style-type: none">---the Address Number Prefix would be "194-" (including the hyphen),---the Address Number would be 3 (converted to "03" (text) in constructing the Complete Address Number),---and the Address Number Suffix would be "1/2".4. Special care should be taken with records where the Address Number is 0 (zero). Occasionally zero is issued as a valid address number (e.g. Zero Prince Street, Alexandria, VA 22314) or it can be imputed (1/2 Fifth Avenue, New York, NY 10003 (for which the Address Number would be 0 and the Address Number Suffix would be "1/2")). More often, though, zero is shown because the Address Number is either missing or non-existent, and null value has been converted to zero.5. Address Numbers vs. Address "Letters". In rare instances, thoroughfare addresses may be identified by letters instead of numbers (for example, "A" Main Street, "B" Main Street, "C" Main Street, "AA" Main Street, "AB" Main Street, etc.) A few thousand such cases have been verified in Puerto Rico, and others may be found elsewhere. In such cases, the letter(s) cannot be treated as an Address Number, because an Address Number must be an integer. The letter(s) also cannot be an Address Number Prefix or Address Number Suffix, because neither of those can be created except in conjunction with an Address Number. Instead, the letter(s) should be treated a Subaddress Identifier in an Unnumbered Thoroughfare Address. (For example: Complete Street Name = "Calle Sanchez," Complete Subaddress Identifier = "AB," Complete Place Name = "Mayaguez" State Name = "PR"). As an alternative, the address may be classified in the General Address Class and treated accordingly.
XML Tag	<AddressNumber>

XML Model	<pre><xsd:simpleType name="AddressNumber_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='[0-9]+' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><CompleteAddressNumber> <AddressNumber>1234</AddressNumber> </CompleteAddressNumber></pre>
Quality Measures	Data Type Measure Spatial Domain Measure Range Domain Measure Address Number Fishbones Measure
Quality Notes	The Address Number element is specified as an integer. Data Type Measure is helpful when testing data held in staging tables with variable character fields. Additional tests for the address number require association with a street name.

2.2.1.3 Address Number Suffix

Element Name	ADDRstandard.AddressNumberSuffix
Other common names for this element	Street Number Suffix, Building Number Suffix, House Number Suffix, Fractional Street Number (USPS), Structure Number Suffix
Definition	The portion of the Complete Address Number which follows the Address Number itself.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Can be created locally from existing values
Source of Values	Local
How Defined	Locally
Example	123 1/2 Main Street 121 E E Street

	B317 A Calle 117 Milepost 34.4 (Address Number Suffix = decimal portion only)
Notes/Comments	<ol style="list-style-type: none"> 1. This element is not found in most Complete Address Numbers. When found, it should be separated from the Address Number so that the Address Number can be maintained as an integer for sorting and quality control tests. 2. Informally an Address Number and Address Number Suffix may be written with or without a space between them. Within this standard, the default assumption is that an empty space separates elements unless stated otherwise. The Attached Element can be used to indicate where the assumed space between the Address Number and Address Number Suffix has been omitted within an address file (see Attached Element for additional notes). 3. If a hyphen appears between the Address Number and the Address Number Suffix, the hyphen is included in the Address Number Suffix. 4. When milepost Complete Address Numbers include decimal fractions, the integer portion of the milepost number is treated as the Address Number, and the fraction (including the decimal point) is treated as an Address Number Suffix. (See Complete Address Number for additional notes on milepost address numbers.)
XML Tag	< AddressNumberSuffix >
XML Model	<pre> <xsd:complexType name="AddressNumberSuffix_type"> <xsd:simpleContent> <xsd:extension base="xsd:string"> <xsd:attribute name="Separator" type="addr_type:Separator_type" /> </xsd:extension> </xsd:simpleContent> </xsd:complexType> </pre>
XML Example	<pre> <CompleteAddressNumber> <AddressNumber>123</AddressNumber> <AddressNumberSuffix Separator="" ">1/2</AddressNumberSuffix> </CompleteAddressNumber> <CompleteAddressNumber> <AddressNumber>456</AddressNumber> <AddressNumberSuffix Separator="" ">B</AddressNumberSuffix> </pre>

	<pre></CompleteAddressNumber> <CompleteAddressNumber> <AddressNumber>317</AddressNumber> <AddressNumberSuffix Separator="">A</AddressNumberSuffix> </CompleteAddressNumber></pre>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure Address Number Fishbones Measure
Quality Notes	<ol style="list-style-type: none"> 1. Address number suffixes can include references to sections of a subdivision or housing complex. Where a tabular domain of values is available the prefix can be tested against it. 2. When geometry for both the address point and a real Address Number Suffix are available the Spatial Domain Measure can be used to measure tests whether the addressed location is within a polygon describing a map-based Address Number Suffix. 3. Use Address Number Fishbones Measure when geometry for both the address point and a linear spatial domain for Address Number Suffix are available. This measure tests whether the addressed location is along a line describing a map-based Address Number Suffix.

2.2.1.4 Complex Element: Complete Address Number

Element Name	CompleteAddressNumber
Other common names for this element	Complete street number, full street number, Primary Address Number (USPS), Street Number (USPS), House Number (USPS, Census TIGER)
Definition	An Address Number, alone or with an Address Number Prefix and/or Address Number Suffix, that identifies a location along a thoroughfare or within a community.
Syntax	{ Address Number Prefix } + { Address Number * } + { Address Number Suffix }
Definition Source	New
Data Type	characterString
Existing Standards for	Refer to component simple elements

this Element	
Domain of Values for this Element	Refer to component simple elements
Source of Values	Refer to component simple elements
How Defined (eg, locally, from standard, other)	Refer to component simple elements
Example	<p>123 Main Street 123 A Main Street 123 1/2 Main Street 0 Prince Street, Alexandria VA 22314 0 1/2 Fifth Avenue, New York, NY 10003 210 East 400 South, Salt Lake City, UT 84111 Milepost 240 Parks Highway Alaska Milepost 72.9 Interstate 84, Wasco County, OR Kilometer 0.5 Carretera 917, Urbanizacion April Gardens, Las Piedras PR 00771 Kilometer 2 Hectometer 7 Carretera 175, Barrio San Antonio, Caguas, Puerto Rico 00725 N89W16758 Appleton Avenue, Menomonee Falls, WI 53051 W63N645 Washington Avenue, Cedarburg, WI 53012 5-5415 Kuhio Highway, Hanalei, HI 96714 194-03 1/2 50th Avenue, New York, NY 11365 A 19 Calle 11, Toa Alta, Puerto Rico</p>
Notes/Comments	<ol style="list-style-type: none"> 1. The Address Number element is required to compose a Complete Address Number. The other elements are optional. 2. The Address Number must be converted from integer to characterString when constructing the Complete Address Number. 3. The great majority of Complete Address Numbers are simple integers. Infrequently the integer is followed by an alphanumeric Address Number Suffix, typically a letter or a fraction. Even more rarely the integer is preceded by an alphanumeric Address Number Prefix. In addition to the typical numbering format, four special-case formats are found in the United States: Milepost addresses, grid-style address numbers, hyphenated address numbers, and other Address Number Prefix letters or symbols. 4. Milepost Complete Address Numbers (Example: "Milepost 240"). Road mileposts are sometimes used to specify locations along highways and similar roads. Mileposts are often used to locate, for example, crash sites, emergency call boxes, bridge locations, inspection stations, roadside rest stops, railroad

crossings, highway exits, park and campground entrances, RV parks, and truck stops. Milepost addresses should be parsed as follows:

- "Milepost" (or equivalent word or phrase, such as "kilometer" or 'Mile Marker') is an Address Number Prefix
- The milepost number (integer part only) is an Address Number
- Tenth, if given, are an Address Number Suffix, including the decimal point.
- The road name or highway route number is a Complete Street Name, and parsed accordingly

Note that, in Puerto Rico, road measurements are given in kilometers (km), which are sometimes divided into hectometers (hm).

5. Grid-style Complete Address Numbers (Example:

"**N89W16758**"). In certain communities in and around southern Wisconsin, Complete Address Numbers include a map grid cell reference preceding the Address Number. In the examples above, "N89W16758" should be read as "North 89, West 167, Address Number 58". "W63N645" should be read as "West 63, North, Address Number 645." The north and west values specify a locally-defined map grid cell with which the address is located. Local knowledge is needed to know when the grid reference stops and the Address Number begins.

6. Hyphenated Complete Address Numbers (Example: "5-

5415"). In some areas (notably certain parts of New York City, southern California, and Hawaii), Complete Address Numbers often include hyphens. Hyphenated Complete Address Numbers should not be confused with Two Number Address Ranges. The former is a single Complete Address Number while the latter includes two Complete Address Numbers.

7. Hyphenated Complete Address Numbers can be parsed so that the number indicating the site or structure is the Address Number, and the remainder (including the hyphen) is the Address Number Prefix or Address Number Suffix.

8. In New York City, hyphenated Complete Address Numbers (the recommended format for storing complete address numbers in New York City) follow a more complex set of rules. The number to the left of the hyphen indicates the "block" (conceptually--the number does not always change at street intersections and sometimes it changes within a single block face). The number to the right of the hyphen indicates the site or house number within the "block". If the Address Number is less than ten, it is written with a leading zero, as in **194-03 1/2** above. Additional leading zeros may be added to either number to provide for correct sorting if the entire Complete Address Number is treated as a characterString with the hyphen included. Within the address standard, these numbers can be constructed and parsed as follows:

- a. The left-side number (**194**) and the hyphen form the Address Number Prefix element (text), with leading zeros shown if needed.
- b. The right-side number (**3**) is the Address Number (integer), converted to a characterString with the leading zero(s) added (**03**) upon conversion to Complete Address Number.
- c. The suffix, if any (such as the "1/2" in **194-03 1/2**), is an Address Number Suffix.

9. Other Address Number Prefix Letters or Symbols. In Puerto Rico, Address Numbers are commonly preceded by an Address Number Prefix letter (e.g. "A 19"). In Portland, OR, negative Address Numbers have been assigned in an area along the west bank of the Willamette River. The minus sign is represented as a leading zero ("0121" and "121" are two different Complete Address Numbers). In such cases the leading zero should be treated as an Address Number Prefix.

10. Zero as a Complete Address Number. Special care should be taken with records where the Address Number is 0 (zero). Occasionally zero is issued as a valid address number (e.g. 0 Prince Street, Alexandria, VA 22314) or it can be imputed (1/2 Fifth Avenue, New York, NY 10003, for which the Address Number would be 0 and the Address Number Suffix would be "1/2"). More often, though, the Address Number is either missing or non-existent, and null value has been converted to zero.

11. Address Numbers vs. Address "Letters". In rare instances, thoroughfare addresses may be identified by letters instead of numbers (for example, "A" Main Street, "B" Main Street, "C" Main Street, "AA" Main Street, "AB" Main Street, etc.) A few thousand such cases have been verified in Puerto Rico, and others may be found elsewhere. In such cases, the letter(s) cannot be treated as an Address Number, because an Address Number must be an integer. The letter(s) also cannot be an Address Number Prefix or Address Number Suffix, because neither of those can be created except in conjunction with an Address Number. Instead, the letter(s) should be treated a Subaddress Identifier in an Unnumbered Thoroughfare Address. (For example: Complete Street Name = "Calle Sanchez", Complete Subaddress Identifier = "AB", Complete Place Name = "Mayaguez" State Name = "PR"). As an alternative, the address may be classified in the General Address Class and treated accordingly.

XML Tag	< CompleteAddressNumber >
XML Model	<xsd:complexType name= "CompleteAddressNumber_type" >

	<pre> <xsd:sequence> <xsd:element name="AddressNumberPrefix" type="addr_type:AddressNumberPrefix_type" minOccurs="0" maxOccurs="1" /> <xsd:element name="AddressNumber" type="addr_type:AddressNumber_type" minOccurs="1" maxOccurs="1" /> <xsd:element name="AddressNumberSuffix" type="addr_type:AddressNumberSuffix_type" minOccurs="0" maxOccurs="1" /> </xsd:sequence> <xsd:attribute name="AddressNumberParity" type="addr_type:AddressNumberParity_type" /> <xsd:attribute name="AttachedElement" type="addr_type:AttachedElement_type" /> </xsd:complexType></pre>
XML Example	<pre> <CompleteAddressNumber> <AddressNumber>55</AddressNumber> <AddressNumberSuffix Separator=" ">1/2</AddressNumberSuffix> </CompleteAddressNumber> <CompleteAddressNumber> <AddressNumberPrefix Separator=" ">MILEPOST</AddressNumberPrefix> <AddressNumber>72.9</AddressNumber> </CompleteAddressNumber></pre>
Quality Measures	PatternSequenceMeasure
Quality Notes	

2.2.2 Street Name Elements

2.2.2.1 Street Name Pre Modifier

Element Name	StreetNamePreModifier
Other common names for this element	Prefix Qualifier (Census TIGER)
Definition	A word or phrase in a Complete Street Name that <ol style="list-style-type: none"> 1. Precedes and modifies the Street Name, but is separated from it by a Street Name Pre Type or a Street Name Pre Directional or both, or 2. Is placed outside the Street Name so that the Street Name can be used in creating a sorted (alphabetical or alphanumeric) list of

	street names.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	No
Domain of Values for this Element	Can be created locally from existing values
Source of Values	Local
How Defined	Locally
Example	Old North First Street Alternate North Avenue B Old China Spring Road The Oaks Drive Northwest East 14th Street
Notes/Comments	<ol style="list-style-type: none"> 1. A Street Name Pre Modifier precedes and modifies a Street Name, but is separated from the Street Name by a Street Name Pre Type or a Street Name Pre Directional or both. Any word or phrase of a Complete Street Name that precedes the Street Name Pre Directional (or that precedes the Street Name Pre Type, if the Complete Street Name has no Street Name Pre Directional) comprises the Street Name Pre Modifier. 2. In addition, words such as "The" and "Old" may be parsed as Street Name Pre Modifiers when they precede the Street Name but must be excluded from it so that the Street Name will be placed properly in a sorted alphanumeric list. For example, if "The Oaks Drive" should be listed as "Oaks Drive, The", then "The" may be parsed as a Street Name Pre Modifier. If, on the other hand, it should be listed as "The Oaks Drive", then "The" may be included in the Street Name. 3. If a Complete Street Name includes two or more consecutive directional words preceding the Street Name (e.g., Northwest East 14th Street, the last directional word is parsed as a Street Name Pre Directional, and the preceding directional words are parsed as the Street Name Pre Modifier. See Complete Street Name notes for a general discussion of Complete Street Name parsing principles.

	<p>4. For numbered (or, occasionally, lettered) jurisdictional routes (e.g. "Kentucky State Highway 67"), the jurisdiction name and the administrative type of road are included with the type word in the Street Name Pre Type. They are not treated as Street Name Pre Modifiers. Thus for the preceding example, Street Name Pre Type = "Kentucky State Highway"; and Street Name = "67". See Street Name Pre Type for a more complete discussion.</p> <p>5. Street Name Pre Modifiers are not common. Census Bureau TIGER Technical Documentation (Appendix D) lists the following examples of words that are often Street Name Post Modifiers because they are separated from the Street Name by a Street Name Pre Directional or a Street Name Pre Type: Alternate, Business, Bypass, Extended, Historic, Loop, Old, Private, Public, Spur. (Note that most of these words are also used as Street Name Pre Types).</p> <p>6. USPS Publication 28 does not recognize Street Name Pre Modifiers. USPS Publication 28 standards are recognized within the Postal Addressing Profile of this standard.</p>
XML Tag	< StreetNamePreModifier >
XML Model	<pre><xsd:complexType name="StreetNamePreModifier_type"> <xsd:simpleContent> <xsd:extension base="xsd:string"> <xsd:attribute name="Separator" type="addr_type:Separator_type"></xsd:attribute> </xsd:extension> </xsd:simpleContent> </xsd:complexType></pre>
XML Example	<pre><CompleteStreetName> <StreetNamePreModifier>OLD</StreetNamePreModifier> <StreetName>FIRST</StreetName> <StreetNamePostType>STREET</StreetNamePostType> <StreetNamePostDirectional>SOUTHWEST </StreetNamePostDirectional> </CompleteStreetName></pre>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure
Quality Notes	<ol style="list-style-type: none"> Where a specific set of premodifiers are specified for use, they may be maintained as a domain and tested with TabularDomainMeasure. Where a schema may designate a particular area with a Street

	Name Pre Modifier the entries may be tested with SpatialDomainMeasure.
--	--

2.2.1.2 Street Name Pre Directional

Element Name	Street Name Pre Directional
Other common names for this element	Predirectional (USPS), Prefix Direction (Census TIGER), Prefix Directional, Predir, Street Prefix (NFIRS)
Definition	A word preceding the Street Name that indicates the direction or position of the thoroughfare relative to an arbitrary starting point or line, or the sector where it is located.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	USPS Publication 28 Section 233 and 294
Domain of Values for this Element	English: East, West, South, North, Northeast, Southeast, Southwest, Northwest Spanish: Este, Oeste, Sur, Norte; Noreste, Sureste, Suroeste, Noroeste Equivalent words in other languages
Source of Values	USPS Publication 28 Sections 233 and 294 (unabbreviated)
How Defined	As provided by USPS Publication 28 Section 233 and 294
Example	North Main Street Southwest North Street East 400 South North Avenue (directional word is the Street Name) South Carolina Avenue (directional word is part of the Street Name)
Notes/Comments	<ol style="list-style-type: none"> 1. A Street Name Pre Directional is a word preceding the Street Name that indicates the direction or position of the thoroughfare relative to an arbitrary starting point or line, or the sector where it is located. 2. A Complete Street Name may include a Street Name Pre Directional, a Street Name Post Directional, neither, or both.

	<ol style="list-style-type: none">3. To avoid confusion, this standard requires that Street Name Pre Directionals be recorded and stored fully spelled out. Abbreviations can cause ambiguity. For example: "N W Jones St": Is it Northwest Jones Street? Ned Walter Jones Street? North Walter Jones Street? For this reason the standard does not recognize abbreviations for Street Name Pre Directionals. If stored unabbreviated, directionals can be exported as abbreviations when needed for special purposes such as mailing labels.4. For postal addressing, USPS Publication 28 prefers the use of USPS standard abbreviations for Street Name Pre Directionals. USPS Publication 28 sections 233, 294, and Appendix B provide the USPS abbreviations for Street Name Pre Directionals in English and Spanish. USPS standard abbreviations are recognized within the Postal Addressing Profile of this standard.5. Directional words are often used as or in the Street Name (e.g. North Avenue, West Virginia Avenue). Whether a directional word should be placed in the Street Name Pre Directional or the Street Name cannot always be discerned from the Complete Street Name itself. Sometimes the proper parsing must be inferred from the context of the street name, or checked with the street naming authority. For example, if West Virginia Avenue is named for the state of West Virginia, then "West" is part of the Street Name. However, if at some point the street changes names and become East Virginia Avenue, then perhaps "Virginia" is the Street Name, and "East" and "West" are Street Name Pre Directionals. See Complete Street Name notes for a discussion of this and other cases where a Complete Street Name might be parsed in more than one way.6. Occasionally two directional words occur together in or before the Street Name (e.g. "East North Avenue", "West South 9th Street", "North West Ridge Road"). Only one of them can be the Street Name Predirectional. The other one might be part of the Street Name, or a Street Name Pre Modifer. See Complete Street Name notes for a discussion of this and other cases where a Complete Street Name might be parsed in more than one way.7. Local street naming authorities often have rules governing the use of Street Name Pre Directionals in their area of jurisdiction. These rules should be documented in their Address Reference System Street Type Directional And Modifier Rules.
XML Tag	<StreetNamePreDirectional>
XML Model	<xsd:complexType name="StreetNamePreDirectional_type"> <xsd:simpleContent> <xsd:extension base="xsd:string"> <xsd:attribute name="Separator"

	<pre> type="addr_type:Separator_type"></xsd:attribute> </xsd:extension> </xsd:simpleContent> </xsd:complexType></pre>
XML Example	<pre> <CompleteStreetName> <StreetNamePreDirectional>NORTH </StreetNamePreDirectional> <StreetName>MAIN</StreetName> <StreetNamePostType>STREET</StreetNamePostType> </CompleteStreetName></pre>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure
Quality Notes	<ol style="list-style-type: none"> 1. TabularDomainMeasure can test entries against a tabular domain. 2. In cases where an address scheme designates particular areas as corresponding with a given Street Name Pre Directional and the geometry for both the streets and the address scheme's spatial domain, SpatialDomainMeasure can test the entries.

2.2.1.3 Street Name Pre Type

Element Name	StreetNamePreType
Other common names for this element	Prefix type (Census TIGER), Street prefix type, Pre-type
Definition	A word or phrase that precedes the Street Name and identifies a type of thoroughfare in a Complete Street Name.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None (Appendix C1 of USPS Publication 28 provides a useful list of Street Suffixes, but does not recognize their use for Street Name Pre Types)
Domain of Values for this Element	Yes. Although not recognized as Street Name Pre Types, Appendix C1 of USPS Publication 28 contains a useful list of Street Suffixes. Development of a list of Street Name Pre Types can incorporate Street Suffixes from USPS Publication 28 Appendix C1 with local additions.
Source of Values	Although not recognized as Street Name Pre Types, Section 234 and Appendix C of USPS Publication 28 contains a useful list of Street

	Types. Development of a list of Street Name Pre Types can incorporate Street Types from USPS Publication 28 with local additions.
How Defined	By local addressing authority.
Example	Avenue A Calle Aurora Avenue of the Americas Avenue at Port Imperial Alameda de las Pulgas Rue d'Armour Avenue C Loop Rhode Island Route 4 Polk County Road 14A Bypass Highway 22
Notes/Comments	<ol style="list-style-type: none"> 1. A Street Name Pre Type is a word or phrase that precedes the Street Name and identifies a type of thoroughfare in a Complete Street Name. In English-language Complete Street Names, most Street Name Pre Type words are also found as Street Name Post Types. 2. A Complete Street Name usually includes either a Street Name Pre Type or a Street Name Post Type. Occasional Complete Street Names have neither ("Broadway") or both ("Avenue C Loop"). 3. For numbered (or, occasionally, lettered) jurisdictional routes, the Street Name Pre Type includes the type word as well as the jurisdiction name and the administrative type of road. The following examples show the parsing of jurisdictional route names: <ul style="list-style-type: none"> ---Highway 101: Street Name Pre Type = "Highway"; Street Name = "101" ---County Road 88: Street Name Pre Type = "County Road"; Street Name = "88" ---Rhode Island Route 4: Street Name Pre Type = "Rhode Island Route"; Street Name = "4" ---Texas Ranch-to-Market Road 2398: Street Name Pre Type = "Texas Ranch-to-Market Road"; Street Name = "2398" ---Summit County Road XX: Street Name Pre Type = "Summit County Road"; Street Name = "XX" ---United States Highway 99: Street Name Pre Type = "United States Highway"; Street Name = "99". 4. Where a state name is used in a Pre Type as shown above, it is required to be written out in full rather than abbreviated. Similarly the words "United States" must be written out for all "US" routes and highways. The word "County" used in County routes must also be written out in full. 5. If a prepositional phrase appears between the Street Name Pre

- Type and the Street Name, the prepositional phrase is a Separator Element: Avenue **of the** Americas, Alameda **de las**Pulgas. Such constructions are rare in English-language Complete Street Names, but they are common in Spanish-, French-, and Italian-language street names.
6. Type words are often used as or in the Street Name (e.g. "Park Lane Circle"). Whether a type word should be placed in the Street Name Pre Type or the Street Name cannot always be discerned from the Complete Street Name itself. Sometimes the proper parsing must be inferred from the context of the street name, or checked with the street naming authority. See Complete Street Name notes for a discussion of this and other cases where a Complete Street Name might be parsed in more than one way.
 7. Occasionally two or more type words occur together before the Street Name (e.g., "Bypass Highway 22.") All of the words are placed in the Street Name Pre Type, unless the Address Authority has included any of them in Street Name. If the two type words are not part of the Street Name and are not separated from each other by a directional word or other word, they are all placed in the Street Name Pre Type. See Complete Street Name notes for a discussion of this and other cases where a Complete Street Name might be parsed in more than one way.
 8. To avoid confusion, this standard does not recognize any abbreviations for Street Name Pre Types. This standard requires that Street Name Pre Types be recorded and stored fully spelled out. Various inconsistent sets of abbreviations are in use, for various purposes, and none is exhaustive. USPS Publication 28 Appendix C.1 contains the best-known list of street type abbreviations. The National Fire Incident Reporting System (NFIRS) has a slightly different list. Local utilities might use other lists, and various software vendors have incorporated still other lists into their products. Terrace might be abbreviated as "Ter", "Terr", or "Tr". "Tr" might stand for terrace, trail, trace, or track. Any number of different abbreviation sets might be used for given operations or applications within an agency or firm. Therefore Street Name Pre Types should be stored unabbreviated, and related to look-up tables of abbreviations so that the proper set of abbreviations can be applied in views or export routines when needed for special purposes such as mailing labels or 9-1-1 files.
 9. The USPS does not recognize the Street Name Pre Type element for standardized postal addresses. Instead, USPS Publication 28 requires that the Street Name Pre Type be combined into the Street Name, preferably unabbreviated (USPS Publication 28, Sec. 234.2, 295.2, Appendix F, Appendix H). USPS Publication 28 standards are recognized within the Postal Addressing Profile of this standard.

	<p>10. Local street naming authorities often have rules governing the use of Street Name Pre Types in their area of jurisdiction. For example, a jurisdiction might require that "Avenue" precede the Street Name if the Street Name is a letter ("Avenue C"). Where used, such rules should be documented in the Address Authority's Address Reference System Street Type Directional And Modifier Rules.</p>
XML Tag	< StreetNamePreType >
XML Model	<xsd:complexType name="StreetNamePreType_type"> <xsd:simpleContent> <xsd:extension base="xsd:string"> <xsd:attribute name="Separator" type="addr_type:Separator_type"></xsd:attribute> </xsd:extension> </xsd:simpleContent> </xsd:complexType>
XML Example	<CompleteStreetName> <StreetNamePreType>AVENUE</StreetNamePreType> <StreetName>C</StreetName> <StreetNamePostType>LOOP</StreetNamePostType> </CompleteStreetName>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure Related Element Value Measure
Quality Notes	<ol style="list-style-type: none">1. TabularDomainMeasure can test entries against a tabular domain.2. In cases where an Address Reference System designates particular areas as corresponding with a given Street Name Pre Type and the geometry for both the streets and the address scheme's spatial domain, SpatialDomainMeasure can test the entries.3. In some cases a jurisdiction may have associated specific Street Name Pre Type entries with functional aspects of the road that require additional local quality measures. For example, a court may be required to be a dead end, or a boulevard limited to streets divided by a median. While these associations are beyond the scope of the standard they should be considered in planning a quality program for local addresses. Related Element Value Measure is recommended.

2.2.1.4 Street Name

Element Name	Street Name
Other common names for this element	Primary Street Name, Base Name (Census TIGER)
Definition	The portion of the Complete Street Name that identifies the particular thoroughfare (as opposed to the Street Name Pre Modifier, Street Name Post Modifier, Street Name Pre Directional, Street Name Post Directional, Street Name Pre Type, Street Name Post Type, and Separator Element (if any) in the Complete Street Name.)
Definition Source	Adapted from FGDC Draft Address Data Content Standard v. 3 (citing Census)
Data Type	characterString
Existing Standards for this Element	Section 232 of USPS Publication 28
Domain of Values for this Element	Official list of street names maintained by local authority.
Source of Values	Local
How Defined	Defined by local ordinance
Example	Main Street MacIntyre Drive Boston-Providence Turnpike Third Avenue 3rd Avenue Avenue of the Americas East 400 South
Notes/Comments	<ol style="list-style-type: none"> 1. The Street Name is the word or words used to identify a thoroughfare or a portion thereof, excluding any types, directionals, or modifiers in the Complete Street Name. . 2. Every Complete Street Name must include a Street Name. The Street Name field cannot be null in any Complete Street Name. 3. Spelling Consistency: Internal Capitalization, Apostrophes, Hyphens, Spaces Local addressing authorities are urged to follow consistent

	<p>internal street naming practices, and to resolve internal street name inconsistencies, especially for internal capitalization, hyphens, and apostrophes.</p> <p>Example: MacIntyre, McIntyre, Mc Intyre, Mcintyre</p> <p>Example: Smiths Lane, Smith's Lane</p> <p>Example: Boston Providence Turnpike; Boston-Providence Turnpike;</p> <p>Rule: Follow the spelling adopted by the local street naming authority.</p> <p>Discussion: This standard cannot specify local naming conventions.</p> <p>4. State Names Not Abbreviated When Used as Street Names:</p> <p>Example: Pennsylvania Avenue (not "PA Avenue")</p> <p>Rule: Where a Street Name is the name of a State of the United States, the Street Name must be spelled out in full, not abbreviated.</p> <p>5. Numbered Streets</p> <p>Examples: Third Street, 3rd Street, 3 Street</p> <p>Rule: Use the name exactly as given by the local street naming authority.</p> <p>Discussion: This standard cannot specify local naming conventions. Different jurisdictions follow different practices for numbered street names. Pittsburgh spells out "First" through "Twelfth" and uses ordinal numbers ("13th", 14th, etc.) for higher numbers. Washington DC uses ordinal numbers only (1st, 2nd, etc.). Other jurisdictions have their own conventions. This is a matter for local authorities to decide.</p> <p>6. Inclusion of Street Type and Directional Words in Street Names</p> <p>Examples: Court Place, Lane Park Circle, West Virginia Avenue</p> <p>Discussion: Street Names may, in certain instances, contain words that are also used as Street Name Pre Directionals, Street Name Post Directionals, Street Name Pre Types, or Street Name Post Types, See Complete Street Name for a general discussion of street name parsing principles.</p> <p>7. Documentation of Local Street Naming Rules</p> <p>Local street naming authorities typically have rules by which they assign or prohibit Street Names in their area of jurisdiction. These rules should be documented in the Address Reference System Street Naming Rules.</p>
XML Tag	< StreetName >
XML Model	<xsd:simpleType name="StreetName_type"> <xsd:restriction base="xsd:string">

	<pre><xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><CompleteStreetName> <StreetName>CENTRAL</StreetName> <StreetNamePostType>STREET</StreetNamePostType> <StreetNamePostDirectional>SOUTHWEST </StreetNamePostDirectional> </CompleteStreetName> <CompleteStreetName> <StreetName>BOSTON-PROVIDENCE</StreetName> <StreetNamePostType>HIGHWAY</StreetNamePostType> </CompleteStreetName></pre>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure
Quality Notes	In some cases a jurisdiction may have associated a given area with a type of street name: alpha characters, trees, flowers, birds, etc. Where such a scheme exists, along with the geometry for both the streets and the spatial domain, SpatialDomainMeasure can be used to test conformance.

2.2.1.5 Street Name Post Type

Element Name	Street Name Post Type
Other common names for this element	Street Type, Street Suffix, Street Suffix Type, Suffix (USPS), Suffix Type (Census TIGER)
Definition	A word or phrase that follows the Street Name and identifies a type of thoroughfare in a Complete Street Name.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	Section 234 and Appendix C of USPS Publication 28 with provision for local additions
Domain of Values for this	USPS Publication 28 Appendix C with provisions for local additions.

Element	
Source of Values	Section 234 and Appendix C of USPS Publication 28 with provision for local additions.
How Defined	Locally
Example	Main Street MacIntyre Drive Boston-Providence Turnpike Third Avenue 3rd Avenue Avenue C Loop Tenth Street Bypass Lee Highway Access Road
Notes/Comments	<ol style="list-style-type: none">1. A Street Name Post Type is a word or phrase that follows the Street Name and identifies a type of thoroughfare in a Complete Street Name. In English-language Complete Street Names, most Street Name Pre Type words are also found as Street Name Post Types.2. A Complete Street Name usually includes either a Street Name Pre Type or a Street Name Post Type. Occasional Complete Street Names have neither ("Broadway") or both ("Avenue C Loop").3. Street Type words are often used as or in the Street Name (e.g. "Park Lane Circle"). Whether a type word should be placed in the Street Name Post Type or the Street Name cannot always be discerned from the Complete Street Name itself. Sometimes the proper parsing must be inferred from the context of the street name, or checked with the street naming authority. See Complete Street Name notes for a discussion of this and other cases where a Complete Street Name might be parsed in more than one way.4. Occasionally two or more type words occur together after the Street Name (e.g., "Tenth Street Bypass"). All of the words are placed in the Street Name Post Type, unless the Address Authority has included any of them in the Street Name. If the type words are not part of the Street Name and are not separated from each other by a directional word or other word, they are all placed in the Street Name Post Type. See Complete Street Name notes for a discussion of this and other cases where a Complete Street Name might be parsed in more than one way.5. To avoid confusion, this standard does not recognize any abbreviations for Street Name Post Types. This standard requires that Street Name Post Types be recorded and stored fully spelled

	<p>out. Various inconsistent sets of abbreviations are in use, for various purposes, and none is exhaustive. USPS Publication 28 Appendix C.1 contains the best-known list of street type abbreviations. National Fire Incident Reporting System (NFIRS) has a slightly different list. Local utilities might use other lists, and various software vendors have incorporated still other lists into their products. Terrace might be abbreviated as "Ter", "Terr", or "Tr". "Tr" might stand for terrace, trail, trace, or track. Any number of different abbreviation sets might be used for given operations or applications within an agency or firm. Therefore Street Name Post Types should be stored unabbreviated, and related to look-up tables of abbreviations so that the proper set of abbreviations can be applied in views or export routines when needed for specific purposes such as mailing labels or 9-1-1 files.</p> <p>6. The USPS recognizes only the Street Name Post Types listed in USPS Publication 28 Appendix C1. For postal addressing, the USPS prefers that Street Name Post Types be restricted to the words and abbreviated using the standard abbreviation given in Appendix C1. USPS Publication 28 standards are recognized within the Postal Addressing Profile of this standard.</p> <p>7. Local street naming authorities often have rules governing the use of Street Name Post Types in their area of jurisdiction. For example, a jurisdiction might require that a "Street" must run north-south while an "Avenue" must run east-west, or that "Boulevard" can only be applied to a street classified as an arterial, while "Court" can only be used with a cul-de-sac. Where used, such rules should be documented in the authority's Address Reference System Street Type Directional And Modifier Rules.</p>
XML Tag	<StreetNamePostType>
XML Model	<pre><xsd:complexType name="StreetNamePostType_type"> <xsd:simpleContent> <xsd:extension base="xsd:string"> <xsd:attribute name="Separator" type="addr_type:Separator_type"></xsd:attribute> </xsd:extension> </xsd:simpleContent> </xsd:complexType></pre>
XML Example	<pre><CompleteStreetName> <StreetName>BOSTON-PROVIDENCE</StreetName> <StreetNamePostType>HIGHWAY</StreetNamePostType> </CompleteStreetName></pre>

	<pre><CompleteStreetName> <StreetNamePreType>AVENUE</StreetNamePreType> <StreetName>C</StreetName> <StreetNamePostType>LOOP</StreetNamePostType> </CompleteStreetName></pre>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure Related Element Value Measure
Quality Notes	<ol style="list-style-type: none"> 1. TabularDomainMeasure can test entries against a tabular domain. 2. In cases where an Address Reference System designates particular areas as corresponding with a given Street Name Post Type and the geometry for both the streets and the address scheme's spatial domain, SpatialDomainMeasure can test the entries. 3. In some cases a jurisdiction may have associated specific Street Name Post Type entries with functional aspects of the road that require additional local quality measures. For example, a court may be required to be a dead end, or a boulevard limited to streets divided by a median. While these associations are beyond the scope of the standard they should be considered in planning a quality program for local addresses. Related Element Value Measure is recommended.

2.2.1.6 Street Name Post Directional

Element Name	Street Name Post Directional
Other common names for this element	Postdirectional (USPS), Post Directional, Post-direction, Postdir, Suffix Directional, Suffix Direction (Census TIGER), Street Suffix (NFIRS)
Definition	A word following the Street Name that indicates the direction or position of the thoroughfare relative to an arbitrary starting point or line, or the sector where it is located.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	USPS Publication 28 Sections 233, 294 and Appendix B
Domain of	English: East, West, South, North, Northeast, Southeast, Southwest,

Values for this Element	Northwest Spanish: Este, Oeste, Sur, Norte; Noreste, Sureste, Suroeste, Noroeste Equivalent words in other languages
Source of Values	USPS Publication 28 Sections 233, 294 and Appendix B (unabbreviated)
How Defined	As provided by USPS Publication 28 Sections 233, 294 and Appendix B
Examples	Cherry Street North North Avenue SouthWest East 400 South
Notes/Comments	<ol style="list-style-type: none"> 1. A Street Name Post Directional is a word following the Street Name that indicates the direction or position of the thoroughfare relative to an arbitrary starting point or line, or the sector where it is located. 2. A Complete Street Name may include a Street Name Pre Directional, a Street Name Post Directional, neither, or both. 3. To avoid confusion, this standard requires that Street Name Post Directionals be recorded and stored fully spelled out. Abbreviations can cause ambiguity. For example: "N Avenue W"-- Is it "North Avenue W"? "N Avenue West"? "North Avenue West"? For this reason the standard does not recognize abbreviations for Street Name Post Directionals. If stored unabbreviated, directionals can be exported as abbreviations when needed for special purposes such as mailing labels. 4. For postal addressing, USPS Publication 28 prefers the use of USPS standard abbreviations for Street Name Post Directionals. USPS Publication 28 sections 233, 294, and Appendix B provide the USPS abbreviations for Street Name Post Directionals in English and Spanish. USPS standard abbreviations are recognized within the Postal Addressing Profile of this standard. 5. Directional words are often used as or in the Street Name (e.g. "Avenue North"). Whether a directional word should be placed in the Street Name Post Directional or the Street Name cannot always be discerned from the Complete Street Name itself. Sometimes the proper parsing must be inferred from the context of the street name, or checked with the street naming authority. See Complete Street Name notes for a discussion of this and other cases where a Complete Street Name might be parsed in more than one way. 6. Occasionally two directional words occur together in or after the Street Name (e.g. "Boulevard South Southwest", "Pharr Court

	<p>South Northeast"). Only one of them can be the Street Name Post Directional. The other one might be part of the Street Name, or a Street Name Post Modifier. See Complete Street Name notes for a discussion of this and other cases where a Complete Street Name might be parsed in more than one way.</p> <p>7. Local street naming authorities often have rules governing the use of Street Name Post Directionals in their area of jurisdiction. These rules should be documented in their Address Reference System Street Type Directional And Modifier Rules.</p>
XML Tag	<pre><StreetNamePostDirectional></pre>
XML Model	<pre><xsd:complexType name="StreetNamePostDirectional_type"> <xsd:simpleContent> <xsd:extension base="xsd:string"> <xsd:attribute name="Separator" type="addr_type:Separator_type"></xsd:attribute> </xsd:extension> </xsd:simpleContent> </xsd:complexType></pre>
XML Example	<pre><CompleteStreetName> <StreetName>CHERRY</StreetName> <StreetNamePostType>STREET</StreetNamePostType> <StreetNamePostDirectional>NORTH </StreetNamePostDirectional> </CompleteStreetName> <CompleteStreetName> <StreetName>NORTH</StreetName> <StreetNamePostType>AVENUE</StreetNamePostType> <StreetNamePostDirectional>WEST </StreetNamePostDirectional> </CompleteStreetName></pre>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure
Quality Notes	<ol style="list-style-type: none"> 1. TabularDomainMeasure can test entries against a tabular domain. 2. In cases where an address scheme designates particular areas as corresponding with a given Street Name Post Directional and the geometry for both the streets and the address scheme's spatial domain, SpatialDomainMeasure can test the entries.

2.2.1.7 Street Name Post Modifier

Element Name	StreetNamePostModifier
Other common names for this element	Suffix Qualifier (Census TIGER)
Definition	A word or phrase in a Complete Street Name that follows and modifies the Street Name, but is separated from it by a Street Name Post Type or a Street Name Post Directional or both.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	No
Domain of Values for this Element	No
Source of Values	Local
How Defined (eg, locally, from standard, other)	Locally
Example	East End Avenue Extended Banner Fork Road Number 1 Horizon Lane West Southeast
Notes/Comments	<ol style="list-style-type: none"> 1. A Street Name Post Modifier follows and modifies a Street Name, but is separated from the Street Name by a Street Name Post Type or a Street Name Post Directional or both. Any word or phrase of a Complete Street Name that follows the Street Name Post Directional (or that follows the Street Name Post Type, if the Complete Street Name has no Street Name Post Directional) comprises the Street Name Post Modifier. 2. If a Complete Street Name includes two or more consecutive directional words following the Street Name, the first is parsed as a Street Name Post Directional, and the rest are parsed as the Street Name Post Modifier. See Complete Street Name notes for a general discussion of Complete Street Name parsing principles.

	<p>3. Street Name Post Modifiers are not common. Census Bureau TIGER Technical Documentation (Appendix D) lists the following examples of words that are often Street Name Post Modifiers: Access, Alternate, Business, Bypass, Connector, Extended, Extension, Loop, Private, Public, Scenic, Spur, Ramp, Underpass, Overpass. (Note that most of these words are also used as Street Name Post Types).</p> <p>4. USPS Publication 28 does not recognize Street Name Post Modifiers. USPS Publication 28 standards are recognized within the Postal Addressing Profile of this standard.</p>
XML Tag	<pre><StreetNamePostModifier></pre>
XML Model	<pre><xsd:complexType name="StreetNamePostModifier_type"> <xsd:simpleContent> <xsd:extension base="xsd:string"> <xsd:attribute name="Separator" type="addr_type:Separator_type"></xsd:attribute> </xsd:extension> </xsd:simpleContent> </xsd:complexType></pre>
XML Example	<pre><CompleteStreetName> <StreetName>GRAND</StreetName> <StreetNamePostType>BOULEVARD</StreetNamePostType> <StreetNamePostModifier>CUTOFF </StreetNamePostModifier> </CompleteStreetName> <CompleteStreetName> <StreetName>CONCORD</StreetName> <StreetNamePostType>HIGHWAY</StreetNamePostType> <StreetNamePostModifier>EXTENSION </StreetNamePostModifier> </CompleteStreetName></pre>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure
Quality Notes	<ol style="list-style-type: none"> Where a specific set of postmodifiers are specified for use, they may be maintained as a domain and tested with TabularDomainMeasure. Where a schema may designate a particular area with a Street Name Post Modifier the entries may be tested with SpatialDomainMeasure.

2.2.1.8 Separator Element

Element Name	SeparatorElement
Other common names for this element	
Definition	A word, phrase, or symbol used as a separator between components of a complex element or class. The Separator Element is required for Intersection Addresses and for Two Number Address Ranges, and it may be used in constructing a Complete Street Name.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	<p>None. Typical values may include:</p> <ol style="list-style-type: none"> For Two Number Address Ranges: - (hyphen)(spaces optional before or after) For Intersection Addresses: "and", "at", "@", "&", and "&&&" "+", "-", and "y" or "con" (Spanish) each having a space before and after. For Complete Street Names: If a Complete Street Name includes a prepositional phrase between a Street Name Pre Type and a Street Name, the prepositional phrase is treated as a separator: "of the", "de la", "des", etc.
Source of Values	New
How Defined (eg, locally, from standard, other)	Locally.
Example	<ol style="list-style-type: none"> Two Number Address Range (hyphen): 206 - 210 Fourth Street Intersection Address ("and"): Eighth Street and Pine Street. Complete Street Name :("of the", "de las" and "des") Avenue of the Americas, Alameda de las Pulgas; Rue des Etoiles.
Notes/Comments	<ol style="list-style-type: none"> Separator Elements are special words, phrases, or symbols used to separate certain component elements when composing Two Number Address Ranges, Intersection Addresses, or Complete Street Names.

2. The default separator, an empty space, is implicit and is not shown in the syntaxes of complex elements and classes.
- 3. Two Number Address Range.** In the Two Number Address Range, the hyphen separating the low and high Complete Address Numbers is a Separator Element.
- 4. Intersection Addresses.** A Separator Element separates the Complete Street Names in an Intersection Address. Separator values include " and ", " at ", " @ ", " & ", and " && " "+", " - ", and " y " or " con " (Spanish), each having a space before and after. Other values may also be in use. Within a given dataset, one value should be used consistently. (Some address parsing software permits the use of ampersands ("&" or "&&") to signify intersection addresses. Be wary, though--in many programming languages, ampersands are reserved for other uses, which could complicate data exchange.)
- 5. Complete Street Name.** If a prepositional phrase appears between the Street Name Pre Type and the Street Name, the prepositional phrase is a Separator Element: Avenue **of the** Americas, Alameda **de las** Pulgas, Rue **des** Etoiles. Such constructions are rare in English-language Complete Street Names, but they are common in Spanish-, Italian-, and French-language Complete Street Names.

XML Tag	Separator
XML Model:	<pre><xsd:simpleType name="Separator_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example:	<pre><IntersectionAddress Separator="and" > <CompleteStreetName> <StreetName>EIGHTH</StreetName> <StreetNamePostType>STREET</StreetNamePostType> </CompleteStreetName> <CompleteStreetName> <StreetName>PINE</StreetName> <StreetNamePostType>STREET</StreetNamePostType> </CompleteStreetName> <PlaceName PlaceNameType="USPSCommunity">ELLICOT CITY</PlaceName> <StateName>MD</StateName> <ZipCode>21043</ZipCode> </IntersectionAddress> <AddressNumberRange Separator=" - " > <CompleteAddressNumber> <AddressNumber>206</AddressNumber></pre>

	<pre> </CompleteAddressNumber> <CompleteAddressNumber> <AddressNumber>210</AddressNumber> </CompleteAddressNumber> </AddressNumberRange> <CompleteStreetName> <StreetName>AVENUE</StreetName> <StreetNamePostType Separator="of the"> >AMERICAS</StreetNamePostType> </CompleteStreetName> <CompleteStreetName> <StreetName>ALAMEDA</StreetName> <StreetNamePostType Separator="de las"> >PULGAS</StreetNamePostType> </CompleteStreetName> <CompleteAddressNumber> <AddressNumber>61</AddressNumber> <AddressNumberSuffix Separator="-"> >43</AddressNumberSuffix> </CompleteAddressNumber> </pre>
XML Notes:	This entity must be expressed as an empty string to indicate an empty string. Omitting the entity entirely indicates that a space is acceptable.
Quality Measures	TabularDomainMeasure
Quality Notes	If Separator Element entries are maintained within a database, rather than generated as part of a query, they may be tested with TabularDomainMeasure. Their use depends on other elements, and is tested at the classification level.

2.2.1.9 Complex Element: Complete Street Name

Element Name	CompleteStreetName
Other common names for this element	Street name, Road name, Full name (Census TIGER)
Definition	Official name of a thoroughfare as assigned by a governing authority, or an alternate (alias) name that is used and recognized.
Syntax	{ Street Name Pre Modifier } + { Street Name Pre Directional } + {

	Street Name Pre Type } + { Separator Element } + { Street Name * } + { Street Name Post Type } + { Street Name Post Directional } + { Street Name Post Modifier }
Definition Source	New
Data Type	characterString
Existing Standards for this Element	Refer to Component Elements
Domain of Values for this Element	Local domain of values for Complete Street Name. Refer to component elements for domains governing individual elements.
Source of Values	Locally determined
How Defined (eg, locally, from standard, other)	Locally determined
Example	All of the following are complete street names: Main Street North Main Street North Main Street Extended Avenue B Old Avenue B North Broadway Kentucky State Highway 67 North Parkway Boulevard of the Allies Alameda de las Pulgas East 400 South
Notes/Comments	<p>1. CompleteStreetName Components. A Complete Street Name is composed from eight simple elements, which, if used, must appear in the following order: Street Name Pre Modifier, Street Name Pre Directional, Street Name Pre Type, Separator Element, Street Name, Street Name Post Type, Street Name Post Directional, and Street Name Post Modifier. Each of these elements is defined and described elsewhere in the standard.</p> <p>2. Required Element: The Street Name element is required to compose a Complete Street Name. The other elements are optional.</p> <p>3. Parsing: Parsing is the process of resolving a Complete Street Name into its</p>

component simple elements.

Usually parsing is straightforward: there is a Street Name, a Street Name Post Type, and perhaps a Street Name Pre Directional or a Street Name Post Directional. For example:

Main Street: Street Name = "Main"; Street Name Post Type = "Street"

North Main Street: Street Name Pre Directional = "North"; Street Name = "Main"; Street Name Post Type = "Street"

Main Street North: Street Name = "Main"; Street Name Post Type = "Street"; Street Name Post Directional = "North"

3a. Parsing: Street Name Pre Type and Separator Element.

Occasionally the type word precedes the Street Name:

Avenue C: Street Name Pre Type = "Avenue"; Street Name = "C"; Even more rarely, the Street Name Pre Type is separated from the Street Name by a prepositional phrase, which is classified as a Separator Element. Within Complete Street Names, Separator Elements occur only in conjunction with Street Name Pre Types. These are rare in English-language Complete Street Names, but they are common in Spanish, French, and Italian (Alameda **de las Pulgas**, Rue **des Fleurs**). Example:

Boulevard of the Allies: Street Name Pre Type = "Boulevard"; Separator Element = "of the"; Street Name = "Allies";

3b. Parsing: Street Name Pre Modifiers and Street Name Post Modifiers.

Occasional Complete Street Names include words that normally are a part of the Street Name, but are separated from the Street Name by directional or type words. These are classified as Street Name Pre Modifiers or Street Name Post Modifiers. Examples:

Old North Main Street: Street Name Pre Modifier = "Old"; Street Name Pre Directional = "North"; Street Name = "Main"; Street Name Post Type = "Street"

Main Street Extended: Street Name = "Main"; Street Name Post Type = "Street"; Street Name Post Modifier = "Extended" Finally, words such as "The" and "Old" may be parsed as Street Name Pre Modifiers when they precede the Street Name but must be excluded from it so that the Street Name will be placed properly in a sorted alphanumeric list. Example: "Old China Springs Road" might be parsed in either of two ways by the local Address Authority:

Old China Springs Road (parsing 1): Street Name Pre Modifier = "Old"; Street Name = "China Springs"; Street Name Post Type = "Road" (if the name is to be listed as "China Springs Road, Old")

Old China Springs Road (parsing 1): Street Name = "Old China Springs"; Street Name Post Type = "Road" (if the name is to be listed under "Old", or if the Street Name element is not used for creating sorted Complete Street Name lists)

3c. Complete Street Names That Do not Follow The Typical Pattern.

Note 4. describes the logical process for parsing typical Complete Street Names. Certain unusual Complete Street Names do not follow the typical pattern. They are special cases or complex names, and parsing as described in Note 4 below will not result in a properly parsed set of elements. These special cases and complex names are explained in Notes 5 and 6 below.

4. Parsing Procedures for Typical Street Names

In practice, most Address Authorities and users will use a commercial or locally-developed parsing program to parse and standardize the parts of each street name. However, most commercially available parsers follow the USPS definitions and procedures, which differ in significant respects from those of this standard. For example, the USPS model does not recognize Street Name Pre Types as a separate element; they are combined into Street Name. It also does not recognize or allow for either Street Name Pre Modifiers or Street Name Post Modifiers, and does not provide guidance on how to handle them in parsing. The specific differences are discussed more fully in the Postal Addressing Profile of this Standard. It is critical that an Address Authority that plans to parse a dataset containing Complete Street Names be aware of these differences. If a USPS parser is used, the Authority must either revise the parser to comply with this standard, or review the results carefully to insure that all component parts have been properly parsed. Many of the tests in the Data Quality part of this standard can be used for such a review.

The parsing procedure described in this note illustrates the logic of breaking Complete Street Names into their component parts and for identifying special cases and complex names as they are found. Notes 5 and 6 provide guidance on the special cases and complex names where these procedures will not result in a properly parsed set of Street Name elements.

- a. The parser examines the Complete Street Name. If the Complete Street Name includes only one word, then by definition that word is the Street Name. The remaining procedures apply to Complete Street Names with more than one word.
- b. The parser then locates the type words (if any) and the directional words (if any) in relation to the other words. The other words are most likely Street Name words, but they might also be Street Name Pre Modifiers, Street Name Post Modifiers, or Separator Element words. (If there are no other words--that is, if the Complete Street Name is comprised entirely of directional words and type words--the parser should set that Complete Street Name aside as a special case.)
- c. The parser then takes the words in order from right to left (that is,

- from last to first).
- d. If the last word is a directional word, it is parsed as a Street Name Post Directional. (If the last two words are directional words, then the parser sets that Complete Street Name aside as a special case.)
 - e. If the last word is a type word, it is parsed as a Street Name Post Type. Or, if the second-to-last word is a type word, and the last word is a Street Name Post Directional, then it parses the second-to-last word as a Street Name Post Type. (If the two type words are found together, then the parser sets that Complete Street Name aside as a special case.)
 - f. If there is only one word that is neither a type word nor a directional word, it is parsed as the Street Name. If there is more than one such word, and together they form a continuous phrase, the phrase is parsed as the Street Name. (The word or phrase may or may not be followed by a Street Name Post Type and/or a Street Name Post Directional.)
 - g. If a directional and/or a type word precedes the Street Name word(s), it is parsed as a Street Name Pre Directional or a Street Name Pre Type, respectively. Note that the Street Name Pre Directional always precedes the Street Name Pre Type. (If two or more type words, or two or more directional words, are found to precede the Street Name, then the parser sets that Complete Street Name aside as a special case.)
 - h. If a prepositional phrase immediately follows a Street Name Pre Type, then it is removed from the Street Name. It is a Separator Element.
 - i. If there is more than one non-type, non-directional word, and they do not form a continuous phrase, then the parser separates them from the Street Name by a type or directional word. If a non-type, non-directional word occurs:
 - Before a Street Name Pre Directional or Street Name Pre Type, it is a Street Name Pre Modifier.
 - After a Street Name Pre Directional or Street Name Pre Type (or Separator Element), or before a Street Name Post Directional or Street Name Post Type, it is part of the Street Name.
 - After a Street Name Post Directional or Street Name Post Type, it is a Street Name Post Modifier.
 - Between a Street Name Pre Directional and a Street Name Pre Type, or between a Street Name Post Directional and a Street Name Post Type, the parser sets that Complete Street Name aside as a special case.
 - j. If a Street Name begins with a word such as "The" or "Old", and the Address Authority prefers to remove it from the Street Name so that the Street Name can be used as the list word in creating a sorted alphanumeric list of Complete Street Names, then the word is placed in the Street Name Pre Modifier.

- k. Having classified all the words into elements, the parser verifies that each element occurs no more than once, and in the correct order: Street Name Pre Modifier, Street Name Pre Directional, Street Name Pre Type, Separator Element, Street Name, Street Name Post Type, Street Name Post Directional, and Street Name Post Modifier. If any elements are repeated or out of order, the parser sets that Complete Street Name aside as a special case.
- l. Lastly the special cases are examined to determine their correct parsing, based on knowledge of the local Address Reference System and the origin of the particular Complete Street Name. Determine the Street Name first, and then decide how to parse the remaining words.
- m. The end result is a list of valid Complete Street Names, with the correct parsing for each, and a list of valid values for each street name element.

5. Special Cases

5.1. Numbered Local Government, County, State, and U.S. Roads and Highways

5.1a. Description: Numbered (or, occasionally, lettered) jurisdictional route names include a Street Name Pre Type and the route identifier ("Highway 101", "Route AA"). The names may also include the jurisdiction name and the administrative type of road, which should also be included in the Street Name Pre Type.

5.1b. Examples: (see USPS Publication 28 Appendix F for additional examples)

Township Road 20: Street Name Pre Type = "Township Road"; Street Name = "20"

County Road 88: Street Name Pre Type = "County Road"; Street Name = "88"

Kentucky State Highway 67: Street Name Pre Type = "Kentucky State Highway"; Street Name = "67"

US Route 40: Street Name Pre Type = "US Route"; Street Name = "40"

Texas Farm-to-Market Road 2168: Street Name Pre Type = "Texas Farm-to-Market Road"; Street Name = "2168"

5.1c. Procedure: Parse the Street Name Pre Type and all qualifier words, including jurisdictional name (e.g., "Township", "County", "Kentucky State") and administrative type (e.g., "Farm-to-Market"), into the Street Name Pre Type. Place only the number or letters identifying the individual thoroughfare into the Street Name.

5.2. Streets Named for Places, Landmarks, Persons, Corporations or Similar Entities

5.2aDescription: If a street is named for a place, landmark, person, corporation, event, etc., the full name is included in the Street Name. If the full name includes type or directional words, the Complete

Street Name can be ambiguous, that is, the Complete Street Name can be parsed in more than one way, and the correct parsing cannot be determined from the Complete Street Name itself.

5.2b. Example 1: North Lake Street

Parsing 1: Street Name = "North Lake"; Street Name Post Type = "Street"

Parsing 2: Street Name Pre Directional = "North"; Street Name = "Lake"; Street Name Post Type = "Street"

Analysis: If the street is named for North Lake, a geographic feature in the area, then parsing 1 is correct. If South Lake Street is the southern portion of Lake Street, then parsing 2 is correct.

Example 2: West Virginia Avenue

Parsing 1: Street Name = "West Virginia"; Street Name Post Type = "Avenue"

Parsing 2: Street Name Pre Directional = "West"; Street Name = "Virginia"; Street Name Post Type = "Avenue"

Analysis: If West Virginia Avenue is named for the state of West Virginia, then "West" is part of the Street Name, and parsing 1 is correct. However, if it is not named for the state, then the word West is considered a Street Name Pre Directional, and parsing 2 is correct.

Example 3: Old North Church Road

Parsing 1: Street Name = "Old North Church"; Street Name Post Type = "Road"

Parsing 2: Street Name Pre Modifier = "Old"; Street Name Pre Directional = "North"; Street Name = "Church"; Street Name Post Type = "Road"

Analysis: If the street was named for a church called "Old North Church" then the entire name belongs in the Street Name, and parsing 1 is correct. However, if the street is a section of Church Road, with the predirectional North, and is perhaps an old alignment which has been replaced, then parsing 2 is correct, placing "Church" alone as the Street Name, "North" as the Street Name Pre Directional, and "Old" as the Street Name Pre Modifier.

5.2c. Procedure: If there is doubt, confer with the local Address

Authority (or historian) to determine whether the Complete Street Name includes the name of a place, landmark, person, corporation, event, etc.. If so, then place the full name in the Street Name (including any type or directional words in the name), and then parse following the procedure for typical street names. If not, parse the Complete Street Name following the procedure for typical street names.

5.3. Double-directional Grid Street Names without Street Types

5.3a. Description: In Utah, and some areas of Indiana, Complete Street Names often include both a Street Name Pre Directional and a Street Name Post Directional and a numeric Street Name, but do

not contain either a Street Name Pre Type or a Street Name Post Type. The Complete Address Number and the Complete Street Name together give a grid position.

5.3b. Example: 210 East 400 South:

Complete Address Number = "210";
Street Name Pre Directional = "East";
Street Name = "400";
Street Name Post Directional = "South"

CompleteStreetName = "East 400 South"

5.3c. Procedure: Parse the first number as the Complete Address Number, the first directional as the Street Name Pre Directional, the second number as the Street Name, and the second directional as the Street Name Post Directional.

6. Complete Street Names that Do Not Conform to the Typical Pattern

The 2010 TIGER file includes over 2.1 million different Complete Street Names. A pattern analysis of the names suggests that well over 95% of them can be parsed unambiguously using the standard rules and special cases described above. The exceptions can be parsed in more than one way, because either:

1. The Complete Street Name includes multiple type or directional words where one is expected, or
2. The name, directional and type words do not occur in the expected order.

Parsing of such names is complicated by the fact the directional words and type words also are often used in or as Street Names. The exceptions fall into four pattern-types, each discussed more fully below:

1. Complete Street Names composed entirely of directional and street type words (e.g. "East Circle Drive")
2. Complete Street Names with two or more type words preceding or following the Street Name (e.g. "C Street Terrace")
3. Complete Street Names with two or more directional words preceding or following the Street Name (e.g. "North South Avenue")
4. Complex Complete Street Names (e.g. "Flaming Gorge Alternate Loop 2 Road")

In such cases, the Address Authority should determine the correct parsing, based on knowledge of the local Address Reference System and the origin of the particular Complete Street Name.

The Address Authority should document the correct wording and parsing of the name in the record-level metadata, so that it can be done consistently over time. In determining the parsing, the Address Authority should first determine the Street Name, and then decide how to parse the remaining words. (The Address Authority may prefer to parse the name so that the resulting Street

Name element can be used as the listword in creating a sorted alphanumeric list of Complete Street Names.) If authoritative guidance is not available, and parsing must be done anyway, include a comment in the metadata stating that the parsing is presumed but not authoritative.

6.1. Complete Street Names Composed Entirely of Directional and Street Type Words

6.1a Description: In these cases, the Address Authority must determine which of the type or directional words in the Complete Street Name is the Street Name, and which are either Street Name Pre Types, Street Name Pre Directionals , Street Name Post Types, or Street Name Post Directionals. In some cases with multiple type or directional words, the Street Name Pre Modifier and/or the Street Name Post Modifier may also be required to manage all of the given words.

6.1b. Examples: Court Place; Avenue North; Park Lane Circle;

6.2. Complete Street Names with Two or More Type Words Preceding or Following the Street Name

6.2a Description: To parse these Complete Street Names, determine if the type word(s) closest to the Street Name actually form part of the Street Name. If so, parse the word(s) as part of the Street Name. If multiple type words occur outside the Street Name, and they occur consecutively, then all of those words are placed in the Street Name Pre Type (if they precede the Street Name) or the Street Name Post Type (if they follow the Street Name). If the type words are not consecutive--that is, they are separated by a directional or other word--then the type word(s) that are separated are placed in the Street Name Pre Modifier (if they precede the Street Name Pre Type) or the Street Name Post Modifier (if they follow the Street Name Post Type). These determinations are made by the Address Authority based on its knowledge of the local Address Reference System and the origin of the Complete Street Name.

6.2b Examples:

Charles Lane Boulevard: Street Name = "Charles Lane"; Street Name Post Type = "Boulevard" ("Lane" can be used as a type word, but here it is part of the Street Name)

Tenth Street Bypass: Street Name = "Tenth"; Street Name Post Type = "Street Bypass" (Consecutive type words that follow the Street Name are included in the Street Name Post Type)

Lee Highway Access Road: Street Name = "Lee"; Street Name Post Type = "Highway Access Road" (Consecutive type words that follow the Street Name are included in the Street Name Post Type)

Bypass Highway 22: Street Name Pre Type = "Bypass Highway"; Street Name = "22" (Consecutive type words that precede the Street Name are included in the Street Name Pre Type)

Bypass North Highway 22: Street Name Pre Modifier = "Bypass"; Street Name Pre Directional = "North"; Street Name Pre Type = "Highway"; Street Name = "22"; Street Name Pre Type= "Highway"; ("Bypass" and "Highway" do not occur consecutively)

6.3. Complete Street Names with Two or More Directional Words Preceding or Following the Street Name

6.3a Description: Where two directional words occur together before or after the Street Name, the Address Authority must determine whether one or both of the two directional words are actually part of the Street Name, or whether the Complete Street Name includes multiple consecutive pre- or post-directional words. If the Complete Street Name includes multiple consecutive pre- or post-directional words, then all but one are modifiers.

6.3b. Examples:

North West Virginia Avenue, where the street was named for the State of West Virginia: parse "North" as a Street Name Pre Directional, and "West" as part of the Street Name.

East West Highway, where "East West" is known locally to be the Street Name: parse "East-West" as the Street Name, with no Street Name Pre Directional.

North East 14th Street, where "North" and East" are properly separated (and not a mistyping of the quadrant designator "Northeast"): parse the word closest to the Street Name as a Street Name Pre Directional, and the preceding word as a Street Name Pre Modifier.

"Pharr Court **North Northeast**", a Street Name Post Directional followed by a quadrant designator: parse the quadrant designator as a Street Name Post Modifier.

6.4. Complex Complete Street Names

6.4a Description: These Complete Street Names include multiple type and/or directional words interspersed with other words or out of the expected order. In parsing these, use best judgment in determining the Street Names, based on knowledge of the local Address Reference System and the origin of the Complete Street Name. Then determine the parsing of the remaining words into types, directionals, and/or modifiers.

6.4b. Examples: 6th Avenue Frontage Road

East Piper Road Farm Access Road Extended

87th Street South Frontage Road

East Loop 1604 North Access Road

US Highway 127 Loop 1 Connector

US Highway 23 - Kentucky 122 Connector Road

7. Local Discretion in Parsing Complete Street Names.

To provide for consistent and efficient address data exchange, data providers should fit a Complete Street Name into the standard

pattern or special cases given in Notes 4 and 5 where possible, and parse the name according to standard procedure. Where that is not possible, limited discretion is allowed as provided in Note 6.

8. Complete List of Street Names and Alias Street Names

Each Address Authority should establish a domain of values for each street name element, and compose from that a lookup table of valid Complete Street Names, for use in validating addresses and diagnosing street name errors. Official and alternate and names can be distinguished by the Official Status attribute.

Note that alternate and alias names often apply to only a portion of a thoroughfare. For example, US Route 50 in the District of Columbia is an alias for some, but not all, of 14th Street Northwest. Because the relationship between official and alias names changes street segment by street segment, street name relationships cannot be managed fully without reference to a street network model that defines the segments.

9. Creating Sorted Alphabetical and Alphanumeric Lists of Complete Street Names

Address Authorities may wish to create a sorted alphabetical list of Complete Street Names (or an alphanumeric list, if the list includes numbered Complete Street Names). Whether and how this is done is a local matter and outside the scope of this standard. One common method is to list the Complete Street Names in order of the Street Name element. Another common method is to list the Complete Street Names in order of Street Name Pre Type, if present, and then by Street Name. If no simple rule works for all Complete Street Names, the Address Authority may create a look-up table that assigns a particular listword to each Complete Street Name. In addition, if a Street Name begins with a word (such as "The" or "Old") that would cause the Complete Street Name to be listed out of its expected order, the Address Authority may separate that word from the Street Name and place it in the Street Name Pre Modifier.

10. Abbreviations

To avoid confusion, this standard requires that all words in a Complete Street Name be recorded and stored fully spelled out. Abbreviations can create ambiguity. (For example: "E Street": Is it E Street, or is it really East Street?) Various inconsistent sets of street type abbreviations are in use, for various purposes, and none is exhaustive. Therefore street name words should be recorded and stored unabbreviated, and linked to look-up tables of abbreviations so that the proper set of abbreviations can be applied in views or export routines when needed for special purposes such as mailing labels or 9-1-1 files.

For postal addressing, USPS Publication 28 prefers the use of

	<p>USPS standard abbreviations for Street Name Pre Directionals, Street Name Post Directionals, and Street Name Post Types. USPS standard abbreviations are recognized within the Postal Addressing Profile of this standard.</p>
XML Tag	<pre><CompleteStreetName></pre>
XML Model	<pre><xsd:complexType name="CompleteStreetName_type"> <xsd:sequence> <xsd:element name="StreetNamePreModifier" type="addr_type:StreetNamePreModifier_type" minOccurs="0" maxOccurs="1" /> <xsd:element name="StreetNamePreDirectional" type="addr_type:StreetNamePreDirectional_type" minOccurs="0" maxOccurs="1" /> <xsd:element name="StreetNamePreType" type="addr_type:StreetNamePreType_type" minOccurs="0" maxOccurs="1" /> <xsd:element name="StreetName" type="addr_type:StreetName_type" minOccurs="1" maxOccurs="1" /> <xsd:element name="StreetNamePostType" type="addr_type:StreetNamePostType_type" minOccurs="0" maxOccurs="1" /> <xsd:element name="StreetNamePostDirectional" type="addr_type:StreetNamePostDirectional_type" minOccurs="0" maxOccurs="1" /> <xsd:element name="StreetNamePostModifier" type="addr_type:StreetNamePostModifier_type" minOccurs="0" maxOccurs="1" /> </xsd:sequence> <xsd:attribute name="AttachedElement" type="addr_type:AttachedElement_type" /> </xsd:complexType></pre>
XML Example	<pre><CompleteStreetName> <StreetNamePreDirectional>NORTH </StreetNamePreDirectional> <StreetName>MAIN</StreetName> <StreetNamePostType>STREET</StreetNamePostType> <StreetNamePostModifier>EXTENDED </StreetNamePostModifier> </CompleteStreetName> <CompleteStreetName> <StreetNamePreModifier>OLD</StreetNamePreModifier> <StreetNamePreType>AVENUE</StreetNamePreType> <StreetName>B</StreetName> <StreetNamePostDirectional>NORTH</pre>

	</StreetNamePostDirectional> </CompleteStreetName>
Quality Measures	TabularDomainMeasure DuplicateStreetNameMeasure PatternSequenceMeasure
Quality Notes	Note that if tabular and/or domains are maintained for Complete Street Name elements at both levels, simple and complex, quality control checks should be run for simple element components before testing the complex element domain.

2.2.3 Intersection Corner Element

2.2.3.1 Corner Of

Element Name	CornerOf
Other common names for this element	
Definition	A directional word describing a corner formed by the intersection of two thoroughfares.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Northwest, northeast, southeast, southwest North, east, south, west
Source of Values	New
How Defined (eg, locally, from standard, other)	New
Examples	Northwest corner of Scott Street and North Walnut Street, Stillwater OK South corner of North 13th Street and Q Street North, Fort Smith, AR
Notes/Comments	1. The Corner Of element specifies a particular corner of an

	<p>intersection. It is used only in the Intersection Address class.</p> <ol style="list-style-type: none"> 2. Corners are typically identified by the directional word corresponding most closely to the direction of a line bisecting the corner angle. 3. An intersection corner should not be taken as a substitute for a Numbered Thoroughfare Address. If desired, use the Related Address ID and the Address Relation Type to relate an intersection corner to the Numbered Thoroughfare Address(es) at that corner. 4. The phrase "corner of" should be included in the address to ensure that the corner indicator is not mistaken for part of the Complete Street Name.
XML Tag	<CornerOf>
XML Model	<pre><xsd:complexType name="CornerOf_type"> <xsd:simpleContent> <xsd:extension base="xsd:string"> </xsd:extension> </xsd:simpleContent> </xsd:complexType></pre>
XML Example	<CornerOf> North </CornerOf>
Quality Measures	TabularDomainMeasure IntersectionValidityMeasure LocationDescriptionFieldCheckMeasure
Quality Notes	The direction describing the corner in this case may be determined more by the overall direction of the road than compass direction at the specific corner. For that reason, LocationDescriptionFieldCheckMeasure is recommended for testing the content of this element.

2.2.4 Subaddress Elements

2.2.4.1 Subaddress Type

Element Name	Subaddress Type
Other common names for this element	Building: Tower, Block, Terminal, Hangar, Pier Multi-floor Part of a Building: Wing, Tower Floor: Level, Story Multi-unit Part of a Floor: Corridor Unit: Apartment, Suite, Room, Unit, Office, Trailer, Space, Lot, Slip, Berth

	Portion of a Unit: Cubicle, Seat PMB: Private Mail Box General: Secondary Address Designator (USPS), Secondary Address Unit Designator (USPS); Secondary Unit Designator (USPS); Secondary Address Identifier (EPA); Generic Occupancy Type
Definition	The type of subaddress to which the associated Subaddress Identifier applies. (In the examples, Building, Wing, Floor, etc. are types to which the Identifier refers.) See Complete Subaddress for a definition of "subaddress."
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Can be created locally from existing values
Source of Values	Local
How Defined (eg, locally, from standard, other)	Locally
Example	Building 4 Wing 7 Floor 6 Corridor Zero Apartment 2D PMB 596
Notes/Comments	<ol style="list-style-type: none"> 1. The Subaddress Type is used with Subaddress Identifier to designate one of several structures, floors, corridors, units, etc. at a given site. It fits within the general USPS definition of a "secondary address designator" and EPA definition of a "secondary address identifier" 2. USPS Publication 28 Appendix C2 and Section 293 provide a list of common Subaddress Types with standard abbreviations. The FGDC Standard requires storing Subaddress Types fully spelled out, to avoid confusion. If stored unabbreviated, they can be exported as

	<p>standard abbreviations as needed for mailing and other purposes. USPS Abbreviations are recognized within the Postal Addressing Profile of this standard.</p> <p>3. PMB (Private mail box) is a special Subaddress Type. See Subaddress Element notes.</p>
XML Tag	<pre><SubaddressType></pre>
XML Model	<pre><xsd:simpleType name="SubaddressType_type"> <xsd:restriction base="xsd:string" /> </xsd:simpleType></pre>
XML Example	<pre><CompleteSubaddress> <SubaddressElement Element Sequence Number="1" Subaddress Component Order="1" > <SubaddressType>Building</SubaddressType> <SubaddressIdentifier>A</SubaddressIdentifier> </SubaddressElement> <SubaddressElement Element Sequence Number="2" Subaddress Component Order="2" > <SubaddressType>Room</SubaddressType> <SubaddressIdentifier>Empire</SubaddressIdentifier> </SubaddressElement> </CompleteSubaddress></pre>
Quality Measures	TabularDomainMeasure
Quality Notes	<p>Subaddress types may follow defined schemes for particular buildings or complexes. While these associations are beyond the scope of the standard they should be considered in planning a quality program for local addresses. Note that Subaddress Type entries must be associated with an address to test any spatial associations with particular buildings or complexes, and are therefore tested at the classification level.</p>

2.2.4.2 Subaddress Identifier

Element Name	Subaddress Identifier
Other common names for this element	Building ID, Floor Id, Apartment Number, Suite Number; Secondary unit indicator (USPS), secondary number (USPS), secondary range (USPS)
Definition	The letters, numbers, words, or combination thereof used to distinguish different subaddresses of the same type when several

	occur within the same feature. See Complete Subaddress for a definition of "subaddress."
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Can be defined locally from existing values.
Source of Values	Local
How Defined (eg, locally, from standard, other)	Locally
Example	Building 4 Wing 7 Floor 6 Corridor Zero Apartment 2D PMB 596 Mezzanine Penthouse Basement
Notes/Comments	<ol style="list-style-type: none"> 1. The Subaddress Identifier, in combination with the Subaddress Type, is used to designate one of several subaddresses within or between structures at a given site. 2. See Subaddress Element and Complete Subaddress for additional notes.
XML Tag	<SubaddressIdentifier>
XML Model	<pre><xsd:simpleType name="SubaddressIdentifier_type"> <xsd:restriction base="xsd:string" /> </xsd:simpleType></pre>
XML Example	<pre><CompleteSubaddress> <SubaddressElement Element Sequence Number="1" Subaddress Component Order="1" ></pre>

	<pre><SubaddressType>Building</SubaddressType> <SubaddressIdentifier>A</SubaddressIdentifier> </SubaddressElement> <SubaddressElement Element Sequence Number="1"> Subaddress Component Order="2" > <SubaddressType>Room</SubaddressType> <SubaddressIdentifier>Empire</SubaddressIdentifier> </SubaddressElement> </CompleteSubaddress></pre>
Quality Measures	RangeDomainMeasure TabularDomainMeasure
Quality Notes	Subaddress identifiers may follow defined schemes for particular buildings or complexes. While these associations are beyond the scope of the standard they should be considered in planning a quality program for local addresses. Note that Subaddress Identifier entries must be associated with an address to test any spatial associations with particular buildings or complexes, and are therefore tested at the classification level

2.2.4.3 Complex Element: Subaddress Element

Element Name	SubaddressElement
Other common names for this element	Secondary address identifier (USPS, EPA)
Definition	A single combination of Subaddress Type and Subaddress Identifier (or, in some cases, a Subaddress Identifier alone), which, alone or in combination with other Subaddress Elements, distinguishes one subaddress within or between structures from another when several occur within the same feature. See Complete Subaddress for a definition of "subaddress."
Syntax	{ Subaddress Type } + { Subaddress Identifier* }
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values	No

for this Element	
Source of Values	N/A
How Defined (eg, locally, from standard, other)	N/A
Attributes Associated with this Element	Subaddress Component Order
Example	Building 4 Wing 7 North Tower Floor 6 Sixth Floor Corridor Zero Apartment 2D PMB 596 Empire Room Penthouse
Notes/Comments	<ol style="list-style-type: none"> 1. An Subaddress Element, alone or in combination with other Subaddress Elements, forms a Complete Subaddress. 2. In English, if the Subaddress Identifier is a name or an ordinal number, the Subaddress Identifier usually but not always precedes the Subaddress Type ("North Tower," "Sixth Floor," "Empire Room,"). If the Subaddress Identifier is a cardinal number, letter designator, or alphanumeric, it typically follows the Subaddress Type ("Building 4," "Apartment 2D", "Hanger A"). Common usage is loose, and there are numerous exceptions to both rules, and patterns differ in other languages. The Subaddress Component Order can be used to indicate the order in which the Subaddress Type and Subaddress Identifier should be written. 3. Some Subaddress Elements use only one word ("Mezzanine"). In such cases, by definition the word is considered an Subaddress Identifier, and the Subaddress Type is null. Other examples (all from USPS Publication 28 Appendix C2) are: Penthouse, Lobby, Basement, Front, Rear, Upper, Lower, Side. 4. The Special case of PMB (Private Mail Box) Subaddresses. Normally a PMB (Private Mail Box), like a mailstop code and other internal mail distribution codes, pertains to the recipient and is not part of the address. However, USPS Publication 28

	<p>Section 284 states, "Exception: When the CMRA [commercial mail receiving agency] mailing address contains a secondary address element (e.g. rural route box number, suite, # or other term), the CMRA customer must use Private Mail Box (PMB) when utilizing a three line address format. Examples:</p> <p>---RR 1 Box 12 PMB 596</p> <p>---10 Main Street Suite 11 PMB 234 "</p> <p>The abbreviation "PMB" is recognized within this standard, along with a few others defined by the USPS for designating postal delivery boxes. PMB is the only Subaddress Type that can appear in the USPSPostal Delivery Box or USPSPostal Delivery Route address classes.</p>
XML Tag	<pre>< SubaddressElement ></pre>
XML Model	<pre><xsd:complexType name="SubaddressElement_type"> <xsd:sequence> <xsd:element name="SubaddressType" type="addr_type:SubaddressType_type" maxOccurs="1" minOccurs="0" /> <xsd:element name="SubaddressIdentifier" type="addr_type:SubaddressIdentifier_type" maxOccurs="1" minOccurs="1" /> </xsd:sequence> <xsd:attribute name="ElementSequenceNumber" type="addr_type:ElementSequenceNumber_type" /> <xsd:attribute name="SubaddressComponentOrder" type="addr_type:SubaddressComponentOrder_type" /> <xsd:attribute name="Separator" type="addr_type:Separator_type" /> </xsd:complexType></pre>
XML Example	<pre><CompleteSubaddress> <SubaddressElement Element Sequence Number="1" Subaddress Component Order="1" > <SubaddressType>Building</SubaddressType> <SubaddressIdentifier>A</SubaddressIdentifier> </SubaddressElement> <SubaddressElement Element Sequence Number="2" Subaddress Component Order="1" > <SubaddressType>Floor</SubaddressType> <SubaddressIdentifier>7</SubaddressIdentifier> </SubaddressElement> </CompleteSubaddress></pre>
Quality Measures	PatternSequenceMeasure

Quality Notes	Subaddress elements may follow defined schemes for particular buildings or complexes. While these associations are beyond the scope of the standard they should be considered in planning a quality program for local addresses. Note that Subaddress Element entries must be associated with an address to test any spatial associations with particular buildings or complexes, and are therefore tested at the classification level
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2.2.4.4 Complex Element: Complete Subaddress

Element Name	CompleteSubaddress
Other common names for this element	See Subaddress Element
Definition	<p>One or more Subaddress Elements that identify a subaddress within an addressed feature. A subaddress is a separate, identifiable portion of a feature, the whole of which is identified by a:</p> <ul style="list-style-type: none">--- Complete Address Number and Complete Street Name (in the case of a Numbered Thoroughfare Address)--- Two Complete Address Numbers, separated by a hyphen, and followed by a Complete Street Name (in the case of a Two Number Address Range)--- Complete Street Name (in the case of an Unnumbered Thoroughfare Address)--- Complete Landmark Name (in the case of a Landmark Address)--- Complete Address Number and Complete Landmark Name or Complete Place Name (in the case of a Community Address)--- USPS Box or USPS Address (in the case of a USPSPostal Delivery Box or USPSPostal Delivery Route address; for these classes, PMB (private mail box) is the only Subaddress Typepermitted.)
Syntax	A series of one or more Subaddress Elements. If more than one are listed, the Element Sequence Number can be used to show the order in which they should be listed.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None

Domain of Values for this Element	None
Source of Values	N/A
How Defined (eg, locally, from standard, other)	N/A
Attributes Associated with this Element	Element Sequence Number
Example	<ol style="list-style-type: none"> 1. 123 Main Street, Apartment 101 2. 1000 Aviation Road, Building 4, Wing 7, Floor 6, Corridor Zero, Office 2B 3. Metro Airport, Terminal A, Gate C27 4. Average Suburban Office Park, Building 12, Mezzanine, Suite 200 5. 800 West Mountain Road, Building 6, Suite 450 7. 740 Park Avenue, Apartment 15/16B 8. 1324-26 Calle Amapolas, Apartamento 103 9. Five-Star Hotel, East Tower, Penthouse 9. U.S. Dept. of Agriculture Building, Wing 7, Room 324 10. General Hospital, Cardiac Wing, Room 224 11. U.S. Department of Commerce Building, Room 6056 (Floor 6, Corridor Zero, Room 56) 12. Pentagon, Room 3D126 (Third floor, D ring, First corridor, Room 26) 13. RR 1 Box 12 PMB 596 14. 10 Main Street Suite 11 PMB 234
Notes/Comments	<ol style="list-style-type: none"> 1. Complete Subaddresses and their component elements pertain to a wide variety of residential, and commercial buildings, from single basement apartments to multi-structure office parks, as well as countless specialized structures such as airports, piers, warehouses, manufacturing plants, and stadiums. Complete Subaddresses are typically designated by the property owner, and addressing authorities usually have no responsibility for compiling or verifying them. However, this is changing as address verification becomes more important for government purposes such as security, emergency response, and verification of eligibility for voting, school attendance, and public services. 2. Usually Complete Subaddresses follow a pattern of Building-Floor-Room (or Doorway), but due to the wide variety of cases no

	general rule can be given. In composing the Complete Subaddress, the Subaddress Elements should be ordered from largest to smallest, or in the order one would encounter them in navigating from outside the site to the designated subaddress. If desired, use the Element Sequence Number to indicate the sequence in which the Subaddress Elements should be ordered.
XML Tag	<CompleteSubaddress>
XML Model	<pre><xsd:complexType name="CompleteSubaddress_type"> <xsd:sequence> <xsd:element name="SubaddressElement" type="addr_type:SubaddressElement_type" minOccurs="1" maxOccurs="unbounded" /> </xsd:sequence> </xsd:complexType></pre>
XML Example	<pre><CompleteSubaddress> <SubaddressElement Element Sequence Number="1" Subaddress Component Order="1" > <SubaddressType>Building</SubaddressType> <SubaddressIdentifier>A</SubaddressIdentifier> </SubaddressElement> <SubaddressElement Element Sequence Number="2" Subaddress Component Order="1" > <SubaddressType>Floor</SubaddressType> <SubaddressIdentifier>7</SubaddressIdentifier> </SubaddressElement> </CompleteSubaddress></pre>
Quality Measures	RepeatedElementUniquenessMeasure ComplexElementSequenceNumberMeasure PatternSequenceMeasure
Quality Notes	This test for the Complete Subaddress assumes that quality tests have been run for supporting elements: Subaddress Type, Subaddress Identifier and Subaddress Element.

2.2.5 Landmark Name Elements

2.2.5.1 Landmark Name

Element Name	Landmark Name
Other common names for this element	Point of interest
Definition	The name of a relatively permanent feature of the manmade landscape that has recognizable identity within a particular cultural context.
Definition Source	Adapted from U.S. Board on Geographic Names, "Principles, Policies, Procedures," (Online Edition (revised), 2003, as posted May 17, 2006 at http://geonames.usgs.gov/docs/pro_pol_pro.pdf), p. 48, definition of "geographic name".
Data Type	characterString
Existing Standards for this Element	None, but see GNISFeature ID
Domain of Values for this Element	Can be created locally from existing values.
Source of Values	Local
How Defined (eg, locally, from standard, other)	Locally
Attributes Associated with this Element	Element Sequence Number, GNISFeature ID
Examples	U.S. Capitol Building Empire State Building Winona Park Elementary School Valley Mall Yosemite National Park
Notes/Comments	1. A Landmark Name specifies a location by naming it. It does not relate the named feature to any thoroughfare system or coordinate reference system and therefore provides no information about where to find the feature. Many addresses

- include Landmark Names without any thoroughfare names, and as such Landmark Names form the basis for two address classes: Landmark Address and Community Address.
2. Landmark names are given to both natural and manmade features. In general, natural landmark names are not used in addresses and are therefore excluded from the scope of this standard. Thus "Yosemite National Park" could be part of an address, and therefore is within the scope of the standard, whereas "Yosemite Falls" and "Yosemite Valley" (naming the natural features) would not.
 3. The difference between Landmark Name and a Place Name is not always clear and distinct. As a general principle, a landmark is under a single use or ownership or control, while places are not. Thus a landmark, even if it covers an extensive area, might be considered to be a single "master address" (often containing multiple subordinate addresses), while a place generally includes numerous separate addresses. These general principles apply to most cases and are useful as general distinctions, but exceptions and marginal cases are easily found.
 4. Local address authorities may wish to compile a list of locally-recognized Landmark Names used as addresses for their convenience. Whether to do so, and if so what names to include, are implementation matters to be decided locally.
 5. Most named landmarks that are used as addresses are also designated by one or more thoroughfare addresses. These should be cross-referenced to each other as Related Address IDs, using the Address Relation Type attribute to record the relationship between them.
 6. Landmark Name, as used in this standard, does not imply any officially-designated historic landmark status, nor is it restricted to features having such status.
 7. The U.S. Board on Geographic Names has compiled and standardized names for many landmarks in the Geographic Names Information System (GNIS), each identified by a unique GNISFeature ID. Local authorities are encouraged to review the GNISFeature ID for more information on the use of the GNIS ID with Landmark Names.
 8. The U.S. Board on Geographic Names has defined 65 classes of features for use in classifying features listed in GNIS. These classes, while neither exhaustive nor necessarily definitive for addressing purposes, may provide useful guidance in distinguishing Place Names, manmade Landmark Names, and natural landmark names.

---Manmade landmark classes (the names of these features are often used in addresses and therefore generally within the scope of this standard): airport, bridge, building, canal,

	<p>cemetery, church, crossing, dam, harbor, hospital, levee, locale, military, mine, oilfield, park, post office, reserve, reservoir, school, tower, trail, tunnel, well.</p> <p>---PlaceName classes (the names of these features are generally Place Names within this standard): Census, civil, populated place.</p> <p>---Natural landmark classes (the names of these features are generally outside the scope of this standard): arch, area, arroyo, bar, basin, bay, beach, bench, bend, cape, cave, channel, cliff, crater, falls, flat, forest, gap, glacier, gut, island, isthmus, lake, lava, pillar, plain, range, rapids, ridge, sea, slope, spring, stream, summit, swamp, valley, woods.</p> <p>The complete feature class definitions can be found from the GNIS Domestic Names search page. See Appendix A (U.S. Geological Survey) for a complete citation.</p>
XML Tag	< LandmarkName >
XML Model	<xsd:complexType name="LandmarkName_type"> <xsd:simpleContent> <xsd:extension base="xsd:string"> <xsd:attribute name="ElementSequenceNumber" type="addr_type:ElementSequenceNumber_type" /> </xsd:extension> </xsd:simpleContent> </xsd:complexType>
XML Example	<CompleteLandmark> <LandmarkName>YOSEMITÉ NATIONAL PARK</LandmarkName> </CompleteLandmark>
Quality Measures	UniquenessMeasure TabularDomainMeasure SpatialDomainMeasure
Quality Notes	Some landmarks will be nested within a larger one, the latter constituting a spatial domain. Similarly, a tabular domain may be associated with an outer landmark.

2.2.5.2 Complex Element: Complete Landmark Name

Element Name	CompleteLandmarkName
Other common names for this element	
Definition	One or more Landmark Names which identify a relatively permanent feature of the manmade landscape that has recognizable identity within a particular cultural context.
Syntax	A series of one or more Landmark Names. If more than one are listed, the Element Sequence Number can be used to show the order in which they should be listed.
Definition Source	Adapted from U.S. Board on Geographic Names, "Principles, Policies, Procedures," (Online Edition (revised), 2003, as posted May 17, 2006 at http://geonames.usgs.gov/docs/pro_pol_pro.pdf), p. 48, definition of "geographic name".
Data Type	characterString
Existing Standards for this Element	None, but see GNISFeature ID
Domain of Values for this Element	Can be created locally from existing values
Source of Values	Local
How Defined (eg, locally, from standard, other)	Locally
Examples	University of Washington , Seattle, WA Suzzallo Library, University of Washington , Seattle, WA Statue of Liberty , New York, NY Statue of Liberty, Liberty Island , New York, NY Yosemite National Park , CA Camp Curry, Yosemite National Park , CA
Notes/Comments	1. Landmark names often refer to extensive areas, which may contain smaller named landmarks. In these cases the landmark name may function as a single "master address" containing multiple subordinate addresses. The Complete Landmark Name provides for the inclusion of multiple Landmark Names in an

	<p>address.</p> <p>2. Where multiple Landmark Names are given, they are typically ordered from smallest to largest. The Element Sequence Number can be used to indicate the sequence in which the Landmark Names should be ordered.</p> <p>4. The U.S. Board on Geographic Names has compiled and standardized names for many landmarks in the Geographic Names Information System (GNIS). Local authorities are encouraged to review the GNISFeature ID for more information on the use of the GNIS ID and Landmark Names. Where a complete landmark name consists of more than one landmark name, the GNIS Code for the smallest unit of the complete landmark name should be used to provide the most specific reference.</p>
XML Tag	< CompleteLandmarkName >
XML Model	<xsd:complexType name="CompleteLandmarkName_type"> <xsd:sequence> <xsd:element name="LandmarkName" type="addr_type:LandmarkName_type" minOccurs="1" maxOccurs="unbounded" /> </xsd:sequence> <xsd:attribute name="Separator" type="addr_type:Separator_type" /> </xsd:complexType>
XML Example	<CompleteLandmark Separator=","> <LandmarkName ElementSequenceNumber="1">CAMP CURRY</LandmarkName> <LandmarkName ElementSequenceNumber="2">YOSEMITE NATIONAL PARK</LandmarkName> </CompleteLandmark>
Quality Measures	RepeatedElementUniquenessMeasure ComplexElementSequenceNumberMeasure PatternSequenceMeasure
Quality Notes	

2.2.6 Place, State, and Country Name Elements

2.2.6.1 Place Name

Element Name	Place Name
Other common names for this element	<p>Unincorporated community or neighborhood: Community, neighborhood, subdivision, district, ward, borough (in, for example, New York City); Barrio, sector, urbanization, parcela, extension, mansion, reparto, villa, parque, jardine, urbanizacion place name (Puerto Rico); Census designated place, populated place (GNIS), locale (GNIS)</p> <p>Incorporated local government: Municipality, city, borough, town, village, township, actual city, location city, situs city, municipal place name, minor civil division, corporation, consolidated government, metropolitan government, unified government, populated place (GNIS), locale (GNIS)</p> <p>USPS Post Office Name: Post office, mailing city, city (as in "City, State, ZIP"), city name; APO, FPO, DPO (for overseas US military and diplomatic mail delivery)</p> <p>County: Parish (Louisiana); Census Area, City and Borough, and Unorganized Borough (Alaska), Municipality (Alaska and the Commonwealth of the Northern Mariana Islands), Municipio (Puerto Rico), City (Maryland, Missouri, Nevada, and Virginia), District (American Samoa), Island (American Samoa and U.S. Virgin Islands)</p> <p>Region: Metropolitan area, metropolitan statistical area (Census), consolidated metropolitan statistical area (Census), primary metropolitan statistical area (Census)</p>
Definition	The name of an area, sector, or development (such as a neighborhood or subdivision in a city, or a rural settlement in unincorporated area); incorporated municipality or other general-purpose local governmental unit; county or county-equivalent; or region within which the address is physically located; or the name given by the U.S. Postal Service to the post office from which mail is delivered to the address.
Definition Source	New; partly adapted from: 1. FGDC's "Framework Data Content Standard Part 5: Governmental unit and other geographic area boundaries"; and, 2. USPS Publication 28, Section 292, "Urbanization".
Data Type	characterString
Existing Standards for	No single controlling authority, but the Geographic Names Information System (GNIS) attempts to include and standardize the

this Element	names of all populated places and incorporated local governments (see GNISFeature ID). For USPS Post Office names, the controlling authority is the USPS "City State File" as referenced in Section 221 of USPS Publication 28
Domain of Values for this Element	None (but see existing standards above). Can be created locally from existing values.
Source of Values	Locally determined (but see existing standards above)
How Defined (eg, locally, from standard, other)	Locally.
Attributes Associated with this Element	Place Name Type, Element Sequence Number, GNISFeature ID
Examples	Ajo , AZ (unincorporated community in Pima County, AZ) Urbanizacion Los Pinos (Puerto Rican urbanization) Barrio Miraflor (Puerto Rican barrio) Portola Valley , CA (incorporated town) Birmingham , AL (city) Salt Lake City , UT (city) Queens (New York City borough) Orleans Parish , LA (county) APO AE (overseas military postal delivery) FPO AP (overseas military postal delivery) DPO AE (overseas US State Department postal delivery)
Notes/Comments	<ol style="list-style-type: none"> 1. "Place name" can mean different things to different people in different contexts. It may name a community, an incorporated local government, a post office, a county, or a region. For many thoroughfare and landmark addresses, a different place name may be used by an emergency dispatcher directing an ambulance, a local government official assessing local taxes or eligibility for services, a postal clerk, or a business providing contact information on its website. 2. This standard provides the Place Name Type attribute to allow the use of different place names with the same address for different purposes. Five types are defined: unincorporated community or neighborhood, incorporated local government, U.S. Post Office name, county, and region. Other types may be added. Additional explanation is given in the notes below and under Place Name Type.

3. The U.S. Board of Geographic Names has assigned GNIS Codes to all place names that have been registered and accepted by the Board. This standard provides the GNISFeature IDattribute to accommodate those codes. For more information on GNIS, see GNISFeature ID or <http://geonames.usgs.gov/domestic/index.html>

Notes on Community Names:

1. A community name refers to an area, sector, or development, such as a neighborhood or subdivision in a city, or a rural settlement in unincorporated area, that is not an incorporated general-purpose local government or county. The name may arise from official recognition or from popular usage.
2. Numerous different terms are used to denote different kinds of communities and community names, but the distinctions are not particularly significant in constructing addresses. An extensive list of terms and definitions can be found in "Framework Data Content Standard Part 5: Governmental unit and other geographic area boundaries," Tables 11 and 15.
3. Community names are of particular importance in Puerto Rican addresses. Street names and address ranges are repeated in many Puerto Rican municipios (county equivalents); these repeated addresses are distinguished from each other by their community name. Administratively, Puerto Rican municipios are divided into barrios and sectors. Smaller areas, such as urbanizaciones and parcelas, may be recognized locally, and all of them may be used in locating an address. For postal addressing, repeated addresses are distinguished from each other by their urbanizacion or equivalent community name. For more information on postal addressing standards for Puerto Rico, see USPS Publication 28 Section 29, and USPS "Addressing Standards for Puerto Rico and the Virgin Islands" (especially sections 2 and 5).

Notes on Municipal and County Place Names:

1. County and municipal names indicate the county and the general-purpose local government area (if any) in which the address is physically located. Local government types and terminologies vary substantially from state to state, but the distinctions are not particularly significant in constructing addresses. An extensive list of terms and definitions can be found in "Framework Data Content Standard Part 5: Governmental unit and other geographic area boundaries," Table 13.
2. Exact municipal and county names are required by public administrators for correct assessing local taxes, assignment of voting precinct, school enrollment, and provision of local government services.
3. Addresses in unincorporated portions of counties have no

	<p>municipal place name by definition.</p> <p>4. Many governments have a legal name and a popular name ("Saint Paul" vs. "City of Saint Paul"). For addressing, the popular name is generally preferable if it is unique within the county and state.</p> <p>5. New York City is comprised of five administrative boroughs (Bronx, Brooklyn, Manhattan, Queens, and Staten Island). The boroughs are legally distinct from the five counties that are also subdivisions of New York City (Bronx, Kings, New York, Queens, and Richmond) even though the boroughs and counties have identical boundaries and two even share the same name.</p> <p>Notes on USPS Place Names:</p> <ol style="list-style-type: none">1. The USPS place name is assigned to the post office from which the USPS delivers mail to the address.2. USPS place names are preferred for postal operations. However, they are often not the best-suited place names for non-postal purposes such as navigation, public service delivery, and emergency response.3. For postal purposes, the USPS strongly discourages the use of multiple place names in an address. For example, the USPS online ZIP finder will find a ZIP code for an address in ""Wailuku, HI," but not for "Wailuku, Maui, HI."4. For overseas US military postal addresses, "APO" (Army Post Office) or "FPO" (Fleet Post Office) is used as the Place Name (see USPS Publication 28, Section 225.1 and 238.1). "DPO" (Diplomatic Post Office) is used as the Place Name for some overseas US State Department postal addresses (see USPS Pub 28 Sec. 239). <p>Notes on Regional Place Names:</p> <ol style="list-style-type: none">1. A region name refers to the region where the address is physically located. Typically this is the name of the central city within the region. For precise, systematic terms, U.S. Census Bureau terms and definitions may be applied, but popular usage is often imprecise and to some extent subjective. Businesses and residents near a regional center often use the central-city name in their address, even if the address is located some distance outside the limits of the city itself.
XML Tag	< PlaceName >
XML Model	<xsd:complexType name="PlaceName_type"> <xsd:simpleContent> <xsd:extension base="xsd:string"> <xsd:attribute name="PlaceNameType" type="addr_type:PlaceNameType_type" /> <xsd:attribute name="ElementSequenceNumber"

	<pre> type="addr_type:ElementSequenceNumber_type" /> <xsd:attribute name="GNISFeatureID" type="addr_type:GNISFeatureID_type" /> </xsd:extension> </xsd:simpleContent> </xsd:complexType></pre>
XML Example	<PlaceName>ORLEANS PARISH</PlaceName>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure
Quality Notes	Some place names will be nested within a larger one, the latter constituting a spatial domain. Similarly, a tabular domain may be associated with an outer place name.

2.2.6.2 Complex Element: Complete Place Name

Element Name	CompletePlaceName
Other common names for this element	See Place Name
Definition	One or more Place Names which identify an area, sector, or development (such as a neighborhood or subdivision in a city, or a rural settlement in unincorporated area); incorporated municipality or other general-purpose local governmental unit; county; or region within which the address is physically located; or the name given by the U.S. Postal Service to the post office from which mail is delivered to the address.
Syntax	A series of one or more Place Names. If more than one is listed, the Place Name Type can be used to specify the type for each Place Name (e.g., community, municipal, postal, county, region) and the Element Sequence Number can be used to show the order in which they should be listed.
Definition Source	See Place Name
Data Type	characterString
Existing Standards for this Element	No single controlling authority, but the Geographic Names Information System (GNIS) attempts to include and standardize the names of all populated places and incorporated local governments (see GNISFeature ID). For USPS Post Office names, the controlling authority is the

	USPS "City State File" as referenced in Section 221 of USPS Publication 28
Domain of Values for this Element	None (but see existing standards above)
Source of Values	Local (but see existing standards above)
How Defined (eg, locally, from standard, other)	Locally.
Examples	<p>Ajo, Pima County, AZ (unincorporated community in Pima County, AZ)</p> <p>Portola Valley, CA (incorporated town)</p> <p>Birmingham, AL (city)</p> <p>Salt Lake City, UT (city)</p> <p>Queens, New York, NY (New York City borough)</p> <p>Orleans Parish, LA (county)</p> <p>FPO AA (overseas military postal delivery)</p> <p>New Hope Community, Shelby County, AL (unincorporated community Shelby County, AL)</p> <p>Capitol Hill, Washington, DC (neighborhood in Washington, DC)</p> <p>Wailuku, Maui, HI</p> <p>Edgewater Park, Bronx, New York, NY (neighborhood in New York City)</p> <p>Sector La Frontera, Barrio Cotui, San German, PR (Puerto Rican sector)</p> <p>Urbanizacion Altamaria, Toa Baja, PR (Puerto Rican urbanizacion)</p> <p>Jardines Los Almendros, Municipio Maunabo, PR (Puerto Rican urbanization)</p> <p>Parcelas Nuevas, Barrio Rincon, Cidra, PR (Puerto Rican parcelas)</p>
Notes/Comments	<ol style="list-style-type: none"> 1. "Place name" can mean different things to different people in different contexts. It may name a community, an incorporated local government, a post office, a county, or a region. For many thoroughfare and landmark addresses, a different place name may be used by an emergency dispatcher directing an ambulance, a local government official assessing local taxes or eligibility for services, a postal clerk, or a business providing contact information on its website. 2. For some purposes an address may require more than one place name (e.g., "Wailuku, Maui", "New Hope, Shelby County",

	<p>"Parcelas Nuevas, Barrio Rincon, Cidra"). This is discouraged in postal addresses, but it may be necessary in other contexts, (e.g., to provide both the municipality and county for an address). The Complete Place Name provides for inclusion of multiple Place Names in the address.</p> <ol style="list-style-type: none"> 3. Where multiple Place Names are given, they are typically ordered from smallest to largest. The Element Sequence Number can be used to indicate the sequence in which the Place Names should be ordered. 4. This standard provides the Place Name Type attribute to allow the use of different place names with the same address for different purposes. Five types are defined: community, municipal, postal, county, and regional. Others may be added. Additional explanation is given under Place Name and Place Name Type. 5. The difference between a place and a landmark is not always clear and distinct. As a general principle, a landmark is under a single use or ownership or control, while places are not. Thus a place generally includes numerous separate addresses, while a landmark, even if it covers an extensive area, might be considered to be a single "master address" (often containing multiple subordinate addresses). These general principles apply to most cases and are useful as general distinctions, but exceptions and marginal cases are easily found. 6. The U.S. Board of Geographic Names has assigned GNISFeature ID's to all place names that have been registered and accepted by the Board. Within the address standard,GNISFeature ID's may be associated with Place Names to facilitate standardization and unambiguous communication. See GNISFeature ID for more information.
XML Tag	< CompletePlaceName >
XML Model	<pre><xsd:complexType name="CompletePlaceName_type"> <xsd:sequence> <xsd:element name="PlaceName" type="addr_type:PlaceName_type" minOccurs="1" maxOccurs="unbounded" /> </xsd:sequence> <xsd:attribute name="Separator" type="addr_type:Separator_type" /> </xsd:complexType></pre>
XML Example	<pre><CompletePlaceName> <PlaceName Place Name Type="USPSPlaceName"> Ajo </PlaceName></pre>

	<pre></CompletePlaceName> <CompletePlaceName> <PlaceName Place Name Type="County" > Shelby </PlaceName> </CompletePlaceName> <CompletePlaceName> <PlaceName Place Name Type="USPS" > Washington </PlaceName> </CompletePlaceName> <CompletePlaceName> <PlaceName Place Name Type="Community" > Urbanizacion Los Olmos </PlaceName> </CompletePlaceName> <CompletePlaceName> <PlaceName Place Name Type="Community">Queens</PlaceName> <PlaceName Place Name Type="Municipal">New York</PlaceName> </CompletePlaceName></pre>
Quality Measures	RepeatedElementUniquenessMeasure ComplexElementSequenceNumberMeasure Pattern Sequence Measure
Quality Notes	

2.2.6.3 State Name

Element Name	State Name
Other common names for this element	State; Commonwealth (PA, MA, KY, VA, PR, MP); Territory (AS, GU, MP, PR, VI); District (DC); Minor Outlying Islands (UM); overseas military or diplomatic "state" (AA, AE, AP)
Definition	The names of the US states and state equivalents: the fifty US states, the District of Columbia, and all U.S. territories and outlying possessions. A state (or equivalent) is "a primary governmental division of the United States." The names may be spelled out in full or represented by their two-letter USPS or ANSI abbreviation.
Definition Source	Names and abbreviations: ANSI INCITS 38:200x, and USPS Publication 28 Appendix B Definition of 'state': Framework Data Content Standard Part 5:

	Governmental Unit and Other Geographic Area Boundaries," (Table 13).
Data Type	characterString
Existing Standards for this Element	ANSI INCITS 38:200x, and USPS Publication 28 Appendix B
Domain of Values for this Element	Yes
Source of Values	ANSI INCITS 38:200x, and USPS Publication 28 Appendix B
How Defined (eg, locally, from standard, other)	ANSI INCITS 38:200x, and USPS Publication 28 Appendix B
Example	Chicago, Illinois Chicago IL Dover, Delaware Dover DE Hagatna, Guam Hagatna GU APO AE Wake Island UM
Notes/Comments	<ol style="list-style-type: none"> 1. The State Name element follows the ANSI INCITS 38:200x standard (formerly the FIPS 5-2 standard) and USPS Publication 28 by including within the definition of State Name the fifty US states, the District of Columbia (DC), and US territories and possessions (AS, GU, MP, PR, and VI). In addition, USPS Publication 28 recognizes three overseas military and diplomatic State Name equivalents (AA, AE, and AP), which the ANSI standard does not; and the ANSI standard recognizes "UM" for US minor outlying islands, which USPS Publication 28 does not. 2. Within this standard State Names may be spelled out in full or they may be represented by their standard two-letter ANSI INCITS 38:200x or USPS abbreviations. 3. For overseas military and diplomatic postal addresses, "AE" or "AP" or "AA" is used as the State Name. "AE" is used for armed forces and certain diplomatic posts in Europe, the Middle East, Africa, and Canada; "AP" for the Pacific; and "AA" for the Americas excluding Canada (see USPS Publication 28, Section 225.1 and Appendix B). 4. The ANSI INCITS 38:200x standard abbreviations include the

	<p>abbreviation UM for U.S. Minor Outlying Islands. These are nine small, remote islands or island groups that do not receive direct mail delivery: Midway Islands, Wake Island, Johnson Atoll, Kingman Reef, Palmyra Atoll, Jarvis Island, Howland Island, Baker Island, and Navassa Island.</p> <p>5. In rare cases, the postal state and the physical location state of the address are not the same. This occurs in some communities on the borders of two states. In these cases, the physical address should be treated as the primary or official address, including the physical state name, while the postal address with its state name should be listed as an alias.</p>
XML Tag	<StateName>
XML Model	<pre><xsd:simpleType name="StateName_type"> <xsd:restriction base="xsd:token"> <!-- "US State and The District of Columbia" Abbreviations --> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<StateName>VA</StateName> <hr/> <StateName>VIRGINIA</StateName>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure
Quality Notes	

2.2.6.4 Zip Code

Element Name	Zip Code
Other common names for this element	ZIP5, Zone Improvement Plan
Definition	A system of 5-digit codes that identifies the individual Post Office or metropolitan area delivery station associated with an address.
Definition Source	USPS, "Quick Service Guide 800: Glossary of Postal Terms and Abbreviations in the DMM."

Data Type	characterString
Existing Standards for this Element	Yes
Domain of Values for this Element	Yes
Source of Values	USPS
How Defined (eg, locally, from standard, other)	USPS is the sole source of this information.
Example	Birmingham, AL 35305 Webster Groves, MO 63119
Notes/Comments	Strictly speaking a ZIPCode is not an area but a set of USPS delivery points served from the same post office. Delivery points with the same ZIP Code can encompass a single building that has a very high mail volume; a portion of a city; all or parts of several municipalities; or even portions of more than one county (and, in a few cases, more than one state).
XML Tag	< ZipCode >
XML Model	<pre><xsd:simpleType name="ZipCode_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='[0-9]{5}' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<ZipCode>35305</Zipcode>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure
Quality Notes	

2.2.6.5 Zip Plus 4

Element Name	ZipPlus4
Other common names for this element	ZIP+4
Definition	A 4-digit extension of the 5-digit Zip Code (preceded by a hyphen) that, in conjunction with the Zip Code, identifies a specific range of USPS delivery addresses.
Definition Source	Adapted from USPS, "Quick Service Guide 800: Glossary of Postal Terms and Abbreviations in the DMM."
Data Type	characterString
Existing Standards for this Element	Yes
Domain of Values for this Element	Yes
Source of Values	USPS is the sole source of this information.
How Defined (eg, locally, from standard, other)	From USPS
Example	Birmingham, Alabama 35242 -3426 Webster Groves, Missouri 63119 -3212
Notes/Comments	<ol style="list-style-type: none">1. Strictly speaking, the Zip Plus 4 consists of "the 5-digit ZIP Code and four additional digits that identify a specific range of USPS delivery addresses" (Quoted from USPS, "Quick Service Guide 800: Glossary of Postal Terms and Abbreviations in the DMM). However this standard separates the two components to facilitate data processing.2. The Zip Code and the Zip Plus 4 are formatted with a hyphen between the two elements (see USPS Publication 28 Sections 343.1, 356 and Appendix A1). It is assumed in this standard that the hyphen is not stored with the Zip Plus 4 value, but is added upon export for display.
XML Tag	< ZipPlus4 >

XML Model	<pre><xsd:simpleType name="ZipPlus4_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='[0-9]{4}' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><ZipCode>35242</ZipCode> <ZipPlus4>3426</ZipPlus4></pre>
Quality Measures	TabularDomainMeasure Related Element Value Measure
Quality Notes	Related Element Value Measure is recommended to check Zip Plus 4 values against the specific street name and address range to which it is assigned.

2.2.6.6 Country Name

Element Name	Country Name
Other common names for this element	Nation
Definition	The name of the country in which the address is located. A country is "an independent, self-governing, political entity."
Definition Source	Country Name: New Country: Framework Data Content Standard Part 5: Governmental Unit and Other Geographic Area Boundaries," (Table 13)
Data Type	characterString
Existing Standards for this Element	ISO 3166-1 Country Names (official short English version)
Domain of Values for this Element	Yes
Source of Values	ISO 3166-1 Country Names (official short English version)
How Defined (eg, locally, from standard, other)	ISO 3166-1 Country Names (official short English version)
Example	1. United States

	2. Canada 3. Mexico
Notes/Comments	<p>1. Although the scope of this standard is restricted to US addresses, Country Name is included for two reasons: to facilitate reconciliation with address standards of other nations, and to accommodate files, which mix addresses from the US and other countries.</p> <p>2. ISO 3166-1 official short English names are specified because they are familiar and concise, and because ISO 3166-1 is specified in the UPU address standard. ISO 3166-1 also specifies a two-character abbreviations for each name, which are recognized within the postal profile of this standard.</p> <p>3. The names and their abbreviations can be found at: http://www.iso.org/iso/en/prods-services/iso3166ma/02iso-3166-code-lists/list-en1.html</p>
XML Tag	<CountryName>
XML Model	<pre><xsd:simpleType name="CountryName_type"> <xsd:restriction base="xsd:string" /> </xsd:simpleType></pre>
XML Example	<CountryName>CANADA</CountryName>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure
Quality Notes	

2.2.7 USPS Postal Address Elements

2.2.7.1 USPS Box Type

Element Name	USPSBoxType
Other common names for this element	PO Box; Box (Obsolete terms: Drawer, Lockbox, Bin, Caller, Firm Caller)
Definition	The name of the class of the container used for receipt of USPS mail. USPS Publication 28 requires the use of "PO Box" or "Box" for this element.
Definition Source	New

Data Type	characterString
Existing Standards for this Element	USPS Publication 28 sections 24, 25, and 28; section 238.1 (Military Addresses); and sections 293 and 295.6 (Puerto Rico Addresses)
Domain of Values for this Element	PO Box (if used in a USPSPostal Delivery Box address). Box (if used in a USPSPostal Delivery Route address)
Source of Values	USPS Publication 28 sections 24, 25, and 28; section 238.1 (Military Addresses); and sections 293 and 295.6 (Puerto Rico Addresses)
How Defined (eg, locally, from standard, other)	USPS Publication 28 sections 24, 25, and 28; section 238.1 (Military Addresses); and sections 293 and 295.6 (Puerto Rico Addresses)
Example	PO Box 6943 PO Box G PO Box 00145 RR 4 Box 19-1A HC 68 Box 45
Notes/Comments	<ol style="list-style-type: none"> 1. In USPSPostal Delivery Box addresses, "PO Box" is required for this element. "Post Office Box addresses are output as "PO Box NN" on the mailpiece." (USPS Publication 28 section 281). 2. In USPSPostal Delivery Route addresses, "Box" is required for this element. <ul style="list-style-type: none"> ---"Print rural route addresses on mailpieces as "RR N Box NN". (USPS Publication 28 section 241) ---"Print highway contract route addresses on mailpieces as "HC N Box NN". (USPS Publication 28 section 251) 3. The USPSPostal Delivery Box and USPSPostal Delivery Route address classes are defined in the Classification Part of this standard.
XML Tag	< USPSBoxType >
XML Model	<pre> <xsd:simpleType name="USPSBoxType_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType> </pre>

XML Example	<USPSBox> <USPSBoxType>PO Box</USPSBoxType> <USPSBoxID>6943</USPSBoxId> </USPSBox>
Quality Measures	TabularDomainMeasure RangeDomainMeasure
Quality Notes	

2.2.7.2 USPSBox ID

Element Name	USPSBoxID
Other common names for this element	PO Box Number; Box Number
Definition	The numbers or letters distinguishing one box from another within a post office or route.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	USPS Publication 28 sections 24, 25, and 28; section 238.1 (Military Addresses); and sections 293 and 295.6 (Puerto Rico Addresses)
Domain of Values for this Element	Yes, within each post office
Source of Values	Local post office
How Defined (eg, locally, from standard, other)	Local post office
Example	PO Box 6943 PO Box G PO Box 00145 RR 4 Box 19-1A HC 68 Box 45
Notes/Comments	1. USPSBox ID's may include numbers or letters, and may include a hyphen. 2. "Post Office Box numbers that are preceded by significant

	leading zeroes are identified in the ZIP+4 file by a hyphen (-) preceding the box number. Convert the hyphen into a zero on the output mailpiece." Example: Convert "PO BOX -0145" to "PO BOX 00145" on output from the ZIP+4 file. (USPS publication 28 Section 282)
XML Tag	<USPSBoxID>
XML Model	<pre><xsd:simpleType name="USPSBoxId_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><USPSBox> <USPSBoxType>PO Box</USPSBoxType> <USPSBoxID>6943</USPSBoxId> </USPSBox></pre>
Quality Measures	TabularDomainMeasure RangeDomainMeasure
Quality Notes	

2.2.7.3 Complex Element: USPS Box

Element Name	USPSBox
Other common names for this element	PO Box, Box, Post Office Box (Obsolete terms: Lockbox, Drawer, Bin, Caller, Firm Caller)
Definition	A container for the receipt of USPS mail uniquely identified by the combination of a USPSBox Type and a USPSBox ID.
Syntax	{ USPSBox Type *} +{ USPSBox ID *}
Definition Source	New
Data Type	characterString
Existing Standards for this Element	USPS Publication 28 sections 24, 25, and 28; section 238.1 (Military Addresses); and sections 293 and 295.6 (Puerto Rico Addresses)
Domain of Values	See component elements.

for this Element	
Source of Values	See component elements.
How Defined (eg, locally, from standard, other)	See component elements.
Example	PO Box 246 Hillsdale, NJ 07642 PO Box 1137 Saipan MP 96950-1137 RR 4 Box 73 Grafton WV 26354 HC 4 Box 100 Blanco TX 78606
Notes/Comments	A USPS Box location has no definite geographic relation to the location of the recipient of the mail.
XML Tag	< USPSBox >
XML Model	<pre> <xsd:complexType name="USPSBox_type"> <xsd:sequence> <xsd:element name="USPSBoxType" type="addr_type:USPSBoxType_type" maxOccurs="1" minOccurs="1" /> <xsd:element name="USPSBoxId" type="addr_type:USPSBoxId_type" maxOccurs="1" minOccurs="1" /> </xsd:sequence> </xsd:complexType> </pre>
XML Example	<USPSAddress> <USPSRoute> <USPSBoxGroupType>PSC</USPSGroupType> <USPSBOXGroupId>4</USPSGroupId> </USPSRoute> <USPSBox> <USPSBoxType>BOX</USPSBoxType> <USPSBoxId>3</USPSBoxId> </USPSBox> </USPSAddress>
Quality Measure	TabularDomainMeasure PatternSequenceMeasure
Quality Notes	In cases where the USPSBox Type and USPSBox ID have been tested, only the PatternSequenceMeasure need be used. Where the data are tested at the USPS Boxlevel, TabularDomainMeasure will be required.

2.2.7.4 USPS Box Group Type

Element Name	USPSBoxGroupType
Other common names for this element	See domain of values below.
Definition	A name for a type of postal delivery point or route containing a group of USPS Boxes.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	USPS Publication 28 sections 24, 25, and 28; section 238.1 (Military Addresses); and sections 293, 295.6, and 295.7 (Puerto Rico Addresses)
Domain of Values for this Element	RR (Rural Route)(Obsolete terms: RD, RFD, Rural Delivery, Rural Free Delivery) HC (Contract Delivery Service Route) (Obsolete terms: Highway Contract Route, Star Route) PSC (Postal Service Center)(Overseas military postal address) CMR (Common Mail Room)(Overseas military postal address) Unit (Overseas military postal address)
Source of Values	USPS Publication 28 sections 24, 25, and 28; section 238.1 (Military Addresses); and sections 293, 295.6, and 295.7 (Puerto Rico Addresses)
How Defined (eg, locally, from standard, other)	USPS Publication 28 sections 24, 25, and 28; section 238.1 (Military Addresses); and sections 293, 295.6, and 295.7 (Puerto Rico Addresses)
Example	1. RR 4, Box 10 2. HC 2, Box 7 3. PSC 4, Box 3 4. CMR 4, Box 2 5. UNIT 475, Box 690
Notes/Comments	1. This group includes rural routes, contract service delivery routes, postal service centers, overseas military common mail rooms and military unit numbers. 2. Contract Delivery Service Routes were formerly called Highway Contract Routes, and are still abbreviated "HC".

XML Tag	<USPSBoxGroupType>
XML Model	<pre><xsd:simpleType name="USPSBoxGroupType_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><USPSAddress> <USPSRoute> <USPSBoxGroupType>PSC</USPSGroupType> <USPSBoxGroupId>4</USPSGroupId> </USPSRoute> <USPSBox> <USPSBoxType>BOX</USPSBoxType> <USPSBoxId>3</USPSBoxId> </USPSBox> </USPSAddress></pre>
Quality Measures	TabularDomainMeasure Related Element Value Measure
Quality Notes	In cases where a specific USPSBox Group Type is associated with a given locality, Related Element Value Measure may be used to test the values.

2.2.7.5 USPS Box Group ID

Element Name	USPSBoxGroupID
Other common names for this element	Rural route number; HC number; PSC/CMR/Unit Number
Definition	The numbers or letters distinguishing one route or distribution point from another route or distribution point of the same USPSBox Group Type.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	USPS Publication 28 sections 24, 25, and 28; section 238.1 (Military Addresses); and sections 293, 295.6, and 295.7 (Puerto Rico Addresses)
Domain of Values	Yes

for this Element	
Source of Values	Local Post office
How Defined (eg, locally, from standard, other)	Local Post office
Example	<ol style="list-style-type: none"> 1. RR 4 Box 10 2. HC 2 Box 7 3. PSC 4 Box 3 4. CMR 4 Box 2 5. UNIT 475 Box 690
Notes/Comments	
XML Tag	< USPSBoxGroupID >
XML Model	<pre><xsd:simpleType name="USPSBoxGroupId_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><USPSAddress> <USPSRoute> <USPSBoxGroupType>PSC</USPSGroupType> <USPSBOXGroupId>4</USPSGroupId> </USPSRoute>* <USPSBox> <USPSBoxType>BOX</USPSBoxType> <USPSBoxId>3</USPSBoxId> </USPSBox> </USPSAddress></pre>
Quality Measures	Tabular Domain Measure Range Domain Measure
Quality Notes	

2.2.7.6 Complex Element: USPS Route

Element Name	USPSRoute
Other common names for this element	See component elements
Definition	A collection of boxes served from a single distribution point, and uniquely identified by a USPSBox Group Type and a USPSBox Group ID.
Syntax	{ USPSBox Group Type *} + { USPSBox Group ID *}
Definition Source	New
Data Type	characterString
Existing Standards for this Element	USPS Publication 28 sections 24, 25, and 28; section 238.1 (Military Addresses); and sections 293, 295.6, and 295.7 (Puerto Rico Addresses)
Domain of Values for this Element	See component elements
Source of Values	See component elements
How Defined (eg, locally, from standard, other)	See component elements
Example	<ol style="list-style-type: none"> 1. RR 4 Box 10 2. HC 2 Box 7 3. PSC 4 Box 3 4. CMR 4 Box 2 5. Unit 475 Box 690
Notes/Comments	Unlike carrier routes and other USPS internal codes for mail sorting and delivery, the USPS Routes must be included in the address to provide sufficient information for delivery of mail.
XML Tag	< USPSRoute >
XML Model	<pre> <xsd:complexType name="USPSRoute_type"> <xsd:sequence> <xsd:element name="USPSBoxGroupType"> </pre>

	<pre> type="addr_type:USPSBoxGroupType_type" maxOccurs="1" minOccurs="1" /> <xsd:element name="USPSBOXGroupId" type="addr_type:USPSBoxGroupId_type" maxOccurs="1" minOccurs="1" /> </xsd:sequence> </xsd:complexType></pre>
XML Example	<pre> <USPSAddress> <USPSRoute> <USPSBoxGroupType>PSC</USPSGroupType> <USPSBOXGroupId>4</USPSGroupId> </USPSRoute> <USPSBox> <USPSBoxType>BOX</USPSBoxType> <USPSBoxId>3</USPSBoxId> </USPSBox> </USPSAddress></pre>
Quality Measure	TabularDomainMeasure PatternSequenceMeasure
Quality Notes	Where USPSBox Group Type and USPSBox Group ID have been tested independently, only PatternSequenceMeasure need be tested. Where the data are tested at the USPS Route level, TabularDomainMeasure is recommended.

2.2.7.7 Complex Element: USPS Address

Element Name	USPSAddress
Other common names for this element	Postal Address
Definition	A USPS postal delivery point identified by a USPS Route and a USPS Box
Syntax	{ USPS Route * } + { USPS Box * }
Definition Source	New
Data Type	characterString
Existing Standards for this Element	USPS Publication 28 sections 24, 25, and 28; section 238.1 (Military Addresses); and sections 293, 295.6, and 295.7 (Puerto Rico Addresses)

Domain of Values for this Element	See Component Elements
Source of Values	USPS Publication 28 sections 24, 25, and 28; section 238.1 (Military Addresses); and sections 293, 295.6, and 295.7 (Puerto Rico Addresses)
How Defined (eg, locally, from standard, other)	See component elements
Example	RR 2 Box 223G Dardanelle AR 72834 HC 3 Box 330 Flasher, ND 58535 PSC 802 Box 74 FPO AA 34058 CMR 416 Box 100 APO AE 09140-0015 Unit 2050 Box 4190 APO AP 96278-2050
Notes/Comments	
XML Tag	< USPSAddress >
XML Model	<pre><xsd:complexType name="USPSAddress_type"> <xsd:sequence> <xsd:element name="USPSRoute" type="addr_type:USPSRoute_type" maxOccurs="1" minOccurs="1"/> <xsd:element name="USPSBox" type="addr_type:USPSBox_type" maxOccurs="1" minOccurs="1"/> </xsd:sequence> </xsd:complexType></pre>
XML Example	<pre><USPSAddress> <USPSRoute> <USPSBoxGroupType>PSC</USPSGroupType> <USPSBoxGroupId>4</USPSGroupId> </USPSRoute> <USPSBox> <USPSBoxType>BOX</USPSBoxType> <USPSBoxId>3</USPSBoxId> </USPSBox> </USPSAddress></pre>
Quality Measure	Pattern Sequence Measure
Quality Notes	

2.2.7.8 USPS General Delivery Point

Element Name	USPSGeneralDeliveryPoint
Other common names for this element	
Definition	A central point where mail may be picked up by the addressee. Two values are permitted: "General Delivery" (for post offices), and ship's names (for overseas military addresses).
Definition Source	New
Data Type	characterString
Existing Standards for this Element	Yes
Domain of Values for this Element	Yes
Source of Values	USPS
How Defined (eg, locally, from standard, other)	USPS Publication 28 Section 26 (General Delivery Addresses); and section 238.1 (overseas military addresses)
Example	General Delivery , Tampa, FL 33602 USCGC Hamilton , FPO AP 96667-3931
Notes/Comments	For general delivery addresses, USPS Publication 28 section 261 specifies, "Use the words GENERAL DELIVERY, uppercase preferred, spelled out (no abbreviation), as the Delivery Address Line on the mailpiece. Each record will carry the 9999 add-on code."
XML Tag	< USPSGeneralDeliveryPoint >
XML Model	<pre> <xsd:simpleType name="USPSGeneralDeliveryPoint_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value=".*' /> </xsd:restriction> </xsd:simpleType> </pre>
XML Example	<USPSGeneralDeliveryPoint>USCGC Hamilton</USPSGeneralDeliveryPoint>

Quality Measures	Tabular Domain Measure
Quality Notes	

2.2.8 USPS Address Lines

2.2.8.1 Delivery Address

Element Name	DeliveryAddress
Other common names for this element	Delivery Address Line (USPS Publication 28); Location Address Text (EPA); Mailing Address Text (EPA)
Definition	The entire address, unparsed, except for the Place Name, State Name, Zip Code, Zip Plus 4, Country Name, and, optionally, Complete Subaddress elements.
Syntax	The Delivery Address syntax depends on the address class. Address class syntaxes are given in the Classification Part of this standard. The Delivery Address syntax is the same as the class syntax, except that the Delivery Address excludes the Place Name, State Name, Zip Code, Zip Plus 4, Country Name, and, optionally, Complete Subaddress elements.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	USPS Publication 28
Domain of Values for this Element	No
Source of Values	NA
How Defined (eg, locally, from standard, other)	NA
Attributes Associated with this Element	Delivery Address Type
Example	Numbered Thoroughfare Address:

	<p>123 Dartmouth College Highway, Suite 100, Lyme, NH 03768 (Delivery Address Type = Subaddress Included) Jones Hall, 123 Dartmouth College Highway, Suite 100, Lyme, NH 03768 (Delivery Address Type = Subaddress Excluded) Intersection Address: West Street & Main Street, Newtown, CT Two Number Address Range: 1400-1420 Smith Street, West Monroe, LA 71292 Unnumbered Thoroughfare Address: East End Road, St. Croix, VI 00820 Landmark Address: Langston Housing Complex, Building 7, Apartment 290, Kansas City KS 66101 Community Address: 1234 Urbanizacion Los Olmos, Ponce PR 00731 Postal Delivery Box: PO BOX 16943, New Orleans LA 70112 USPS Postal Delivery Route: HC 68 BOX 23A, Natchez, MS USPS General Delivery: GENERAL DELIVERY, TAMPA FL 33602-9999.</p>
Notes/Comments	<ol style="list-style-type: none">1. The Delivery Address element corresponds to the Delivery Address Line defined in USPS Publication 28 (sec. 211, 231, 33, 341, and 343).2. This element excludes Place Name, State Name, Zip Code, and Zip Plus 4 and Country Name, which together form the Place State ZIP complex element.3. The Delivery Address typically includes the Complete Subaddress. However, there are sometimes reasons to omit or separate the Complete Subaddress from the Delivery Address. For example, the Complete Subaddress can hamper address geocoding, and contact lists often separate the Complete Subaddress from the rest of the feature address (see, e.g., the EPA Contact Information Data Standard).4. The Delivery Address Type shows whether the Delivery Address includes or excludes the Complete Subaddress.
XML Tag	< DeliveryAddress >
XML Model	<xsd:complexType name="DeliveryAddress_type"> <xsd:extension base="xsd:string"> <xsd:attribute name="DeliveryAddressType" type="addr_type:DeliveryAddressType_type" /> </xsd:extension> </xsd:simpleContent> </xsd:complexType>

XML Example	<pre><DeliveryAddress Delivery Address Type="Subaddress Included">123 Dartmouth College Highway, Suite 100</DeliveryAddress> <DeliveryAddress Delivery Address Type="Subaddress Excluded">123 Dartmouth College Highway, Suite 100</DeliveryAddress> <DeliveryAddress>123 Dartmouth College Highway, Suite 100</DeliveryAddress></pre>
Quality Measures	Pattern Sequence Measure
Quality Notes	

2.2.8.2 Place State ZIP

Element Name	PlaceStateZIP
Other common names for this element	Last Line (USPS)
Definition	The combination of Complete Place Name, State Name, Zip Code, Zip Plus 4, and Country Name within an address. Complete Place Name and State Name are mandatory; the other elements are optional.
Syntax	{ Complete Place Name * } + { State Name * } + { Zip Code } + { Zip Plus 4 } + { Country Name }
Definition Source	New
Data Type	characterString
Existing Standards for this Element	Refer to component elements
Domain of Values for this Element	Refer to component elements
Source of Values	Refer to component elements
How Defined	Refer to component elements
Example	<ol style="list-style-type: none"> 1. Waterville ME 04901 2. Oxford MS 38655-4068

	3. Florence, OR 4. Brattleboro, Windham County, VT
Notes/Comments	1. Place State ZIP corresponds to the Last Line (or City, State, ZIP+4 line) as defined for postal addressing purposes in USPS Publication 28 (secs 211, 33, and 341). 2. Zip Code and Zip Plus 4 are recommended but not mandatory in the Place State ZIP element.
XML Tag	< PlaceStateZIP >
XML Model	<xsd:simpleType name="PlaceStateZip_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType>
XML Example	<PlaceStateZIP>Brattleboro, Windham County, VT</PlaceStateZIP>
Quality Measures	Pattern Sequence Measure
Quality Notes	

2.3 Address Attributes

2.3.1 Address ID

2.3.1.1 Address ID

Element Name	AddressID
Other common names for this element	
Definition	The unique identification number assigned to an address by the addressing authority
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None

Domain of Values for this Element	No
Source of Values	Primary key, issued locally
How Defined (eg, locally, from standard, other)	Locally
Example:	Integer ID: 1243286 UUID: 550e8400-e29b-11d4-a716-446655440000
Notes/Comments	<ol style="list-style-type: none"> 1. The Address ID is a required element of an address data record. The ID must be unique for each address assigned by an Address Authority. The Address ID may be either a locally generated unique ID, or it may be a Universally Unique ID (UUID) that is machine-generated within the database environment. 2. IDs are almost always integers, and integer ID's are much easier to manage. However, some ID schemes use hyphens, leading zeros, or other non-integer characters, so the standard also accommodates alphanumeric IDs. <p>Notes and Reference Information on UUID</p> <ol style="list-style-type: none"> 1. A UUID is presented as a 16-byte (128-bit) number written in hexadecimal form computed according to a UUID algorithm. At least five algorithms have been developed. 2. UUIDs are documented in two standards, ITU-T X.667 and IETF RFC 4122 (see Appendix A for complete references). The two standards are technically consistent. 3. The standard provides for a UUID as a means to identify an address while it is passed from the originating source through a chain of intermediaries to the end-user. The need arises because there exists within the United States no central coordinating body to identify and register addresses. There is not even a registry of the authorities empowered to create addresses, nor is one likely to be created. 4. "The intent of UUIDs is to enable distributed systems to uniquely identify information without significant central coordination. Thus, anyone can create a UUID and use it to identify something with reasonable confidence that the identifier will never be unintentionally used by anyone for anything else. Information labelled with UUIDs can therefore be later combined into a single database without need to resolve name conflicts." (quoted from Wikipedia, "Universally Unique Identifier", as posted 4 September 2010 at:http://en.wikipedia.org/wiki/Universally_Uneque_Identifier)

	r)
XML Tag	<AddressID>
XML Model	<pre><xsd:simpleType name="AddressId_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<AddressID>550e8400-e29b-11d4-a716-446655440000</AddressID>
Quality Measures	Uniqueness Measure
Quality Notes	

2.3.3.2 Address Authority

Element Name	AddressAuthority
Other common names for this element	
Definition	The name of the authority (e.g., municipality, county) that created or has jurisdiction over the creation, alteration, or retirement of an address
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	None
Source of Values	None
How Defined (eg, locally, from standard, other)	Locally
Example	1. Florence County, SC

	<ol style="list-style-type: none"> 2. City of Boulder, CO 3. University of Georgia, Athens, GA (for addresses within the campus) 4. Hartsfield-Jackson International Airport, Clayton County, GA (for addresses within the airport) 5. Bolling Air Force Base, Washington, DC (for addresses within the base)
Notes/Comments	<ol style="list-style-type: none"> 1. The Address Authority is the agency responsible for assigning and administering addresses in a given area. 2. The Address Authority is also responsible for providing unique Address IDs for the addresses it administers. Thus the Address Authority name plus the ID in combination are likely to be unique nationwide. 3. The Address Authority may or may not be the same as the municipal or postal jurisdiction noted for the address. In a given area, there may be multiple authorities, a single authority or no known authority with jurisdiction over address assignment. For example, a state agency may be the Address Authority for a university campus within the municipal boundaries of a city. 4. Contact information for Address Authority will be found in the dataset metadata.
XML Tag	<pre><AddressAuthority></pre>
XML Model	<pre><xsd:simpleType name="AddressAuthority_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><AddressAuthority>City of Boulder, CO</AddressAuthority></pre> <hr/> <pre><AddressAuthority>University of Georgia, Athens, GA</AddressAuthority></pre>
Quality Measures	TabularDomainMeasure SpatialDomainMeasure
Quality Notes	

2.3.3.3 Related Address ID

Element Name	Related Address ID
Other common names for this element	
Definition	The identifier of an address that is related to the identifier of another address.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	None
Source of Values	None
How Defined (eg, locally, from standard, other)	Locally
Examples:	See examples under Address Relation Type
Notes/Comments	<ol style="list-style-type: none"> 1. The Related Address ID is used to relate one address identifier to another address identifier. 2. In database terms, the Related Address ID is linked to the Address ID in a linking table or relationship table. Logically, a Related Address ID cannot exist unless it is associated with an Address ID. 3. In some cases, the Related Address ID designates an alternate address at the same location, for example, a Landmark Address associated with a Numbered Thoroughfare Address, or an official address with its alias, or a retired address in the same location as an active address. 4. In other cases, the Related Address ID designates an address at a different location, for example, the address of a property owner (if the owner does not live on the property), or a property's tax billing address (if it is sent to the mortgage holder). 5. The Address Relation Type attribute can be used to record how the address identified by the Related Address ID is related to the address identified by the Address ID. (See

	Address Relation Type example and notes for additional discussion of Related Address ID.)
XML Tag	<RelatedAddressID>
XML Model	<pre><xsd:complexType name="RelatedAddressID_type"> <xsd:simpleContent> <xsd:extension base="addr_type:AddressID_type"> <xsd:attribute name="AddressRelationType" type="addr_type:AddressRelationType_type" /> </xsd:extension> </xsd:simpleContent> </xsd:complexType></pre>
XML Example	<pre><RelatedAddressID Address Relation Type="Historical Predecessor" >250</RelatedAddressID></pre>
Quality Measures	Repeated Element Uniqueness Measure Related Not Null Measure Tabular Domain Measure
Quality Notes	

2.3.3.4 Address Relation Type

Element Name	AddressRelationType
Other common names for this element	
Definition	The manner in which an address identified by a Related Address ID is related to an address identified by an Address ID.
Definition Source	New
Data Type	characterString
Required Element	None.
Existing Standards for this Element	None
Domain of Values for this Element	May be created locally to standardize terms used to describe relationships.

How Defined (eg, locally, from standard, other)	New
Example	<ol style="list-style-type: none">1. 123 Main St (Address ID = 1000) is also known as the "Grand Old Office Building" (a landmark name, Address ID = 5000). Then for: Related Address ID = 5000, Address ID = 1000, Address Relation Type = Landmark Name Alias Related Address ID = 1000, Address ID = 5000, Address Relation Type = Official Street Address2. Tax bills for 123 Main St (Address ID = 1000) should be sent to PO Box 150080, Omaha, NE 68153 (Address ID = 8000). Correspondence for the owner should be sent to 108 East Burnside Street, Portland, OR 97214. (Address ID = 10267). Then for: Related Address ID = 8000, Address ID = 1000, Address Relation Type = Tax Billing Related Address ID = 10267, Address ID = 1000, Address Relation Type = Owner Mailing3. 123 Main Street was created years ago when 101 Main Street (Address ID = 250) was subdivided into several properties. Then for: Related Address ID = 250, Address ID = 1000, Address Relation Type = Historical Predecessor4. This particular part of Main Street is part of State Route 88. 123 Main Street (Address ID = 1000) is the official address, but 123 State Route 88 (Address ID = 8943) is also recognized. Then for: Related Address ID = 8943, Address ID = 1000, Address Relation Type = Official Alias Address Related Address ID = 1000, Address ID = 8943, Address Relation Type = Official Address5. A large building occupies an entire square block in a downtown area. It has a main entrance to its public lobby at 123 Main Street. However, its loading dock, mail and goods receiving entry, and trash pickup location are on the "back" of the building, which faces Elm Street, and is given the address of 222 Elm Street. In this instance, the main entrance at 123 Main Street has Address ID = 456, while the service entrance at 222 Elm Street has Address ID = 789. The Relationship would be: Address ID = 456, Related Address ID = 789, Address Relation Type = Service Entrance, and conversely Address ID = 789, Related Address ID = 456, Address Relation Type = Official Street Address.

Notes/Comments	<ol style="list-style-type: none"> 1. This element describes how two addresses, identified by their Related Address ID and Address ID respectively, are related. Relationships may be defined and described in any way, according to the needs of the user. To maximize efficiency and clarity, users should establish a limited, standard set of descriptors that meet local needs. 2. To minimize ambiguity, the descriptors should state how the Related Address ID is related to the Address ID, not the other way around. 3. To minimize clutter, short connector words such as "is", "are", "for", "of", etc. may be omitted from the descriptors if the meaning is otherwise clear. 4. Examples 1, 3, and 4 above show how Related Address ID can be used to link an address to its alias addresses or to its historical predecessor address. 5. Example 1 above shows that two addresses must have reciprocal relations, each being designated by the Address ID in one case and the Related Address ID in the other. 6. Example 5 shows how one feature (such as a large building) may have more than one address, each with a different purpose (official street address vs. service entrance). 7. Example 2 above shows that Related Address ID may designate an address that is outside the control of, and perhaps distant from, the Address Authority that created the address it is related to. It is common, for example, for owners to live in different states from properties they own, or for tax bills to be sent to out-of-state mortgage service addresses.
XML Tag	< AddressRelationType >
XML Model	<pre><xsd:simpleType name="AddressRelationType_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><RelatedAddressID AddressRelationType="Historical Predecessor" >250</RelatedAddressID></pre>
Quality Measures	Tabular Domain Measure
Quality Notes	

2.3.2 Address Coordinates

2.3.2.1 Address X Coordinate

Element Name	Address XCoordinate
Other common names for this element	
Definition	The X coordinate of the address location.
Definition Source	New
Data Type	Real
Existing Standards for this Element	Yes
Domain of Values for this Element	Spatial extent of the jurisdiction(s).
Source of Values	Source of spatial data collection.
How Defined (eg, locally, from standard, other)	By reference to a coordinate reference system (see note below).
Example	750908.0469
Notes/Comments	Address XCoordinate values can be interpreted only if their coordinate system, datum, units of measure, and any other coordinate reference system parameters are provided. The parameters can be documented in the dataset metadata, per FGDC's Content Standard for Digital Geospatial Metadata, or by inclusion of the Address Coordinate Reference System Authority and Address Coordinate Reference System ID in each address record. See Address Coordinate Reference System Authority and Address Coordinate Reference System ID for more information.
XML Tag	<AddressXCoordinate>
XML Model	<xsd:simpleType name="AddressXCoordinate_type">

	<xsd:restriction base="xsd:double"> </xsd:restriction> </xsd:simpleType>
XML Example	<AddressXCoordinate>750908.0469 </AddressXCoordinate>
Quality Measures	XYCoordinate Completeness Measure XYCoordinate Spatial Measure
Quality Notes	

2.3.2.2 Address Y Coordinate

Element Name	Address YCoordinate
Other common names for this element	
Definition	The Y coordinate of the address location.
Definition Source	New
Data Type	Real
Existing Standards for this Element	Yes
Domain of Values for this Element	Spatial extent of the jurisdiction(s).
Source of Values	Source of spatial data collection.
How Defined (eg, locally, from standard, other)	By reference to a coordinate reference system.
Example	3740623.0628
Notes/Comments	Address YCoordinate values can be interpreted only if their coordinate system, datum, units of measure, and any other coordinate reference system parameters are provided. The parameters can be documented in the dataset metadata, per FGDC's

	Content Standard for Digital Geospatial Metadata, or by inclusion of the Address Coordinate Reference System Authority and Address Coordinate Reference System ID in each address record. See Address Coordinate Reference System Authority and Address Coordinate Reference System ID for more information.
XML Tag	< AddressYCoordinate >
XML Model	<xsd:simpleType name="AddressYCoordinate_type"> <xsd:restriction base="xsd:double"> </xsd:restriction> </xsd:simpleType>
XML Example	<AddressYCoordinate>3740623.0628 </AddressYCoordinate>
Quality Measures	XYCoordinate Completeness Measure XYCoordinate Spatial Measure
Quality Notes	

2.3.2.3 Address Longitude

Element Name	AddressLongitude
Other common names for this element	
Definition	The longitude of the address location, in decimal degrees.
Definition Source	New
Data Type	Real
Existing Standards for this Element	Adapted from FGDC, "Content Standard for Digital Geospatial Metadata (CSDGM)", which refers to the following standard: ANSI INCITS 61-1986 (R2002), "Representation of Geographic Point Locations for Information Interchange".
Domain of Values for this Element	Spatial extent of the jurisdiction(s).
Source of Values	Source of spatial data collection.
How Defined (eg,	By reference to a coordinate reference system.

locally, from standard, other)	
Example	-84.29049105
Notes/Comments	Address Longitude values can be interpreted only if their coordinate system, datum, units of measure, and any other coordinate reference system parameters are provided. The parameters can be documented in the dataset metadata, per FGDC's Content Standard for Digital Geospatial Metadata, or by inclusion of the Address Coordinate Reference System Authority and Address Coordinate Reference System ID in each address record. See Address Coordinate Reference System Authority and Address Coordinate Reference System ID for more information.
XML Tag	<AddressLongitude>
XML Model	<pre><xsd:simpleType name="AddressLongitude_type"> <xsd:restriction base="xsd:double"> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<AddressLongitude>-84.29049105</AddressLongitude>
Quality Measures	XYCoordinate Completeness Measure XYCoordinate Spatial Measure
Quality Notes	

2.3.2.4 Address Latitude

Element Name	AddressLatitude
Other common names for this element	
Definition	The latitude of the address location, in decimal degrees.
Definition Source	New
Data Type	Real
Existing Standards	Adapted from FGDC, "Content Standard for Digital Geospatial

for this Element	Metadata (CSDGM)", which refers to the following standard: ANSI INCITS 61-1986 (R2002), "Representation of Geographic Point Locations for Information Interchange".
Domain of Values for this Element	Spatial extent of the jurisdiction(s).
Source of Values	Source of spatial data collection.
How Defined (eg, locally, from standard, other)	By reference to a coordinate reference system.
Example	33.77603207
Notes/Comments	Address Latitude values can be interpreted only if their coordinate system, datum, units of measure, and any other coordinate reference system parameters are provided. The parameters can be documented in the dataset metadata, per FGDC's Content Standard for Digital Geospatial Metadata, or by inclusion of the Address Coordinate Reference System Authority and Address Coordinate Reference System ID in each address record. See Address Coordinate Reference System Authority and Address Coordinate Reference System ID for more information.
XML Tag	<AddressLatitude>
XML Model	<pre><xsd:simpleType name="AddressLatitude_type"> <xsd:restriction base="xsd:double"> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<AddressLatitude>33.77603207</AddressLatitude>
Quality Measures	XYCoordinate Completeness Measure XYCoordinate Spatial Measure
Quality Notes	

2.3.2.5 US National Grid Coordinate

Element Name	USNationalGridCoordinate
Other common names for this	USNG Coordinate

element	
Definition	<p>The USNG is an alphanumeric point reference system that overlays the Universal Transverse Mercator (UTM) numerical coordinate system. A USNG coordinate consists of three parts, the:</p> <ol style="list-style-type: none"> 1. Grid Zone Designation (GZD) for worldwide unique geoaddresses (two digits plus one letter, developed from the UTM system). 2. 100,000-meter Square Identification for regional areas (two letters). 3. Grid Coordinates for local areas (always an even number of digits between 2 and 10 depending upon precision).
Definition Source	<p>Adapted from US National Grid, FGDC-STD-011-2001, Section 3.3</p> <p>Quoted from: Tom Terry, "The United States National Grid." <i>Professional Surveyor Magazine</i>. Oct. 2004, p. 12.</p>
Data Type	characterString
Required Element	No
Existing Standards for this Element	US National Grid, FGDC-STD-011-2001.
Domain of Values for this Element	No
Source of Values	
How Defined (from standard, other)	As prescribed in FGDC-STD-011-2001.
Example	<p>18SUJ2348306479 or 18S UJ 23483 06479</p> <p>18S – Identifies a GZD</p> <p>18S UJ – Identifies a specific 100,000-meter square in the specified GZD</p> <p>18S UJ 2 0 - Locates a point with a precision of 10 km</p> <p>18S UJ 23 06 - Locates a point with a precision of 1 km</p> <p>18S UJ 234 064 - Locates a point with a precision of 100 meters</p> <p>18S UJ 2348 0647 - Locates a point with a precision of 10 meters</p> <p>18S UJ 23483 06479 - Locates a point with a precision of 1 meter</p>
Notes/Comments	1. USNG basic coordinate values and numbering are identical to

	<p>Universal Transverse Mercator (UTM) coordinate values over all areas of the United States including outlying territories and possessions. The USNG is based on universally defined coordinate and grid systems and can, therefore, be easily extended for use world-wide as a universal grid reference system.</p> <p>2. USNG coordinates shall be identical to the Military Grid Reference System (MGRS) numbering scheme over all areas of the United States including outlying territories and possessions.</p> <p>3. While their coordinates are the same, the key difference between MGRS and USNG is in the organization of their 100,000-m Square Identification schemes. MGRS uses two 100,000-m Square Identification lettering schemes, depending on which datum is used, while USNG uses only the single scheme associated with NAD 83/WGS 84. When USNG values are referenced to NAD 83/WGS 84, USNG and MGRS values are identical and MGRS can be used as a surrogate when software does not yet support USNG.</p> <p>4. The USNG is not intended for surveying, nor is it intended to replace the coordinate reference system used for digital mapping by local authorities (typically, local or state plane coordinate systems). USNG provides a nationally consistent presentation format and grid for public safety, general public, and commercial activities that is user-friendly in both digital and hardcopy products. USNG values enable use of geocoded address point data with low cost consumer grade GPS receivers and properly gridded maps.</p> <p>5. USNG provides a flexible numbering scheme to accommodate variable precision from tens of kilometers to one meter or higher.</p>
XML Tag	< USNationalGridCoordinate >
XML Model	<xsd:simpleType name="LocationUSNG_type"> </xsd:annotation> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType>
XML Example	<USNationalGridCoordinate>18SUJ2348306479 </USNationalGridCoordinate> ----- <USNationalGridCoordinate>18S UJ 23483 06479</USNationalGridCoordinate>

Quality Measures	Usng Coordinate Spatial Measure
Quality Notes	<p>There are a variety of ways to check USNG coordinate values. Due to the complexity of the USNG standard entire working functions are offered as examples, rather than pseudocode: coord2usng, converting Universal Transverse Mercator (UTM) coordinates to USNG, and usng2coord, converting USNG to UTM.</p> <ol style="list-style-type: none"> 1. The coord2usng function requires both UTM and longitude latitude coordinates, and calculates the UTM zone on the fly. This method was chosen due to common confusion about zone numbers. There are a variety of other ways to structure the conversion. 2. Usng2coord requires only USNG, and is fairly straightforward.

2.3.2.6 Address Elevation

Element Name	AddressElevation
Other common names for this element	Altitude, height, Z-coordinate
Definition	Distance of the address in specified units above or below a vertical datum, as defined by a specified coordinate reference system.
Definition Source	New
Data Type	Real
Existing Standards for this Element	Yes
Domain of Values for this Element	None
Source of Values	Locally defined.
How Defined (eg, locally, from standard, other)	By reference to a coordinate reference system.
Examples	1023.0 (elevation in specified units above a specified vertical datum)

Notes/Comments	<ol style="list-style-type: none"> Address Elevation values can be interpreted only if their vertical datum, units of measure, and any other coordinate reference system parameters are provided. The parameters can be documented in the dataset metadata, per FGDC's Content Standard for Digital Geospatial Metadata, or by inclusion in each address record of the Address Coordinate Reference System Authority and Address Coordinate Reference System ID. See Address Coordinate Reference System Authority and Address Coordinate Reference System ID for more information. The dataset metadata, or the Address Reference System documentation, should state what is measured by the Address Elevation (height of the driveway entrance, main building entrance, ground floor, subaddress main floor, etc.).
XML Tag	<pre><AddressElevation></pre>
XML Model	<pre><xsd:simpleType name="AddressElevation_type"> <xsd:restriction base="xsd:double"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><AddressElevation>1023.0</AddressElevation></pre>
Quality Measures	Address Elevation Measure
Quality Notes	

2.3.2.7 Address Coordinate Reference System ID

Element Name	AddressCoordinateReferenceSystemID
Other common names for this element	Spatial Reference ID (SRID)
Definition	A name or number which, along with the Address Coordinate Reference System Authority, identifies the coordinate reference system to which Address XCoordinate and Address YCoordinate, Address Latitude and Address Longitude, USNational Grid Coordinate, or Address Elevation values are referenced.
Definition Source	New

Data Type	Integer
Existing Standards for this Element	Yes
Domain of Values for this Element	May be defined by the Address Coordinate Reference System Authority.
Source of Values	Address Coordinate Reference System Authority.
How Defined (eg, locally, from standard, other)	Address Coordinate Reference System Authority.
Example	EPSG 2893 Wisconsin State Cartographer's Office, " Dane County Coordinate System "
Notes/Comments	<ol style="list-style-type: none"> 1. A coordinate location cannot be determined without knowledge of the coordinate reference system (CRS) by which the specific coordinate values are defined. The CRS itself is defined by a set of geodetic parameters. The parameters vary according to the type of CRS, but may include, for example, datum, unit of measure, or projection. When the CRS and its geodetic parameters are known, the address location can be determined unambiguously from its coordinates. 2. The Address Coordinate Reference System ID, combined with the Address Coordinate Reference System Authority in the complex element Address Coordinate Reference System, identifies the CRS to which the Address XCoordinate and Address YCoordinate, Address Latitude, Address Longitude, USNational Grid Coordinate, or Address Elevation values are referenced. The Address Coordinate Reference System Authority and the Address Coordinate Reference System ID should refer interested persons to an authoritative source where the geodetic parameters can be found, or else complete reference information should be provided in the file-level metadata. 3. See Address Coordinate Reference System Authority for additional pertinent notes.
XML Model	<pre><xsd:simpleType name="AddressCoordinateReferenceSystemID_type" > <xsd:restriction base="xsd:integer" /> </xsd:simpleType></pre>
XML Example	<pre><AddressCoordinateReferenceSystem> <AddressCoordinateReferenceSystemAuthority>EPSG</pre>

	<pre>Geodetic Parameter Dataset </AddressCoordinateReferenceSystemAuthority> <AddressCoordinateReferenceSystemID>2893 </AddressCoordinateReferenceSystemID> </AddressCoordinateReferenceSystem></pre>
Quality Measures	TabularDomainMeasure Related Element Value Measure
Quality Notes	

2.3.2.8 Address Coordinate Reference System Authority

Element Name	AddressCoordinateReferenceSystemAuthority
Other common names for this element	Spatial Reference System Authority
Definition	The Authority that assigns the unique Address Coordinate Reference System ID (number or name) to the Address Coordinate Reference System to which the Address XCoordinate and Address YCoordinate, Address Latitude and Address Longitude, USNational Grid Coordinate, or Address Elevation are referenced.
Definition Source	New.
Data Type	characterString
Existing Standards for this Element	No
Domain of Values for this Element	None
Source of Values	New
How Defined (eg, locally, from standard, other)	Authority name defined by creator of base map
Examples	1. EPSG Geodetic Parameter Dataset 2. Wisconsin State Cartographer's Office

Notes/Comments	<ol style="list-style-type: none">1. Coordinate values specify a location by reference to a grid, spheroid, or geoid. A coordinate location cannot be determined without knowledge of the coordinate reference system (CRS) by which the specific coordinate values are defined. The CRS itself is defined by a set of geodetic parameters. The parameters vary according to the type of CRS, but may include, for example, datum, unit of measure, or projection. When the CRS and its geodetic parameters are known, the address location can be determined unambiguously from its coordinates.2. The Address Coordinate Reference System Authority, combined with the Address Coordinate Reference System ID in the complex element Address Coordinate Reference System, identifies the CRS to which the Address XCoordinate and Address YCoordinate, Address Latitude, Address Longitude, USNational Grid Coordinate, or Address Elevation values are referenced. The Address Coordinate Reference System Authority and the Address Coordinate Reference System ID should refer interested persons to an authoritative source where the geodetic parameters can be found, or else complete reference information should be provided in the file-level metadata.3. The EPSG Geodetic Parameter Dataset, maintained and published by the Geodesy Subcommittee of the International Association of Oil and Gas Producers (OGP), is an extensive, authoritative, and public compilation of CRS, the geodetic parameters that define them, and conversion and transformation operations that allow coordinates to be changed from one CRS to another. Within the EPSG dataset, each CRS is identified by a COORD_REF_SYS_CODE. Although it is extensive, the EPSG dataset is not exhaustive. The OGC states, "The geographic coverage of the data is worldwide, but it is stressed that the dataset does not and cannot record all possible geodetic parameters in use around the world."4. For examples of CRS not included in the EPSG dataset, see the Wisconsin State Cartographers Office's "Wisconsin Coordinate Systems." This publication gives the projection parameters and associated information for the Wisconsin Coordinate Reference Systems used by each of Wisconsin's 72 counties, identified by county name. The EPSG Dataset includes parameters for various versions of the Wisconsin State Plane Coordinate System, but not for each county CRS.5. If all coordinate values in a dataset are referenced to the same CRS, the CRS should be described in the dataset-level metadata per FGDC's Content Standard for Digital Geospatial Metadata. The Address Coordinate Reference System Authority and Address Coordinate Reference System ID may then be omitted from the individual address records.
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	<p>6. If the address data set includes Address XCoordinate and Address YCoordinate, Address Latitude, Address Longitude, or Address Elevation values based on more than one CRS, each address record should include the Address Coordinate Reference System Authority and Address Coordinate Reference System ID to show which system applies to each value.</p> <p>7. EPSG Guidance Note 7-1 ("Using the EPSG Geodetic Parameter Dataset") provides a clear, concise explanation of the concepts underlying coordinate reference systems, and of the EPSG dataset and its use. EPSG Guidance Note 7-1 can be found at www.epsg.org under "Guidance notes" or "Geodetic dataset."</p> <p>8. The Wisconsin State Cartographers Office publication also includes a concise, clear explanation of the concepts underlying CRS.</p>
XML Tag	< AddressCoordinateReferenceSystemAuthority >
XML Model	<pre><xsd:simpleType name="AddressCoordinateReferenceSystemAuthority _ type"> <xsd:restriction base="xsd:string" /> </xsd:simpleType></pre>
XML Example	<pre><AddressCoordinateReferenceSystem> <AddressCoordinateReferenceSystemAuthority>EPSG Geodetic aParameter Dataset </AddressCoordinateReferenceSystemAuthority> <AddressCoordinateReferenceSystemID>2893 </AddressCoordinateReferenceSystemID> </AddressCoordinateReferenceSystem></pre>
Quality Measure	Tabular Domain Measure
Quality Notes	

2.3.2.9 Complex Element: Address Coordinate Reference System

Element Name	AddressCoordinateReferenceSystem
Other common names for this element	
Definition	{ Address Coordinate Reference System Authority* } + { Address Coordinate Reference System ID* }

Data Type	characterString
Existing Standards for this Element	No
Domain of Values for this Element	No
Source of Values	
How Defined (eg, locally, from standard, other)	From base mapping
Example	EPSG:12349
Notes/Comments	The Address Coordinate Reference System combines the Address Coordinate Reference System Authority and the Address Coordinate Reference System ID. Together they form a unique identifier for any coordinate reference system that might define the coordinate values associated with an address, whether an Address XCoordinate, Address YCoordinate,Address Latitude, Address Longitude, or Address Elevation
XML Tag	< AddressCoordinateReferenceSystem >
XML Model	<pre> <xsd:complexType name="AddressCoordinateReferenceSystem_type"> <xsd:sequence> <xsd:element name="AddressCoordinateReferenceSystemAuthority" type="AddressCoordinateReferenceSystemAuthority_type" /> <xsd:element name="AddressCoordinateReferenceSystemID" type="AddressCoordinateReferenceSystemID_type" "> </xsd:element> </xsd:sequence> </xsd:complexType> </pre>
XML Example	<pre> <AddressCoordinateReferenceSystem> <AddressCoordinateReferenceSystemAuthority>EPSG Geodetic Parameter Dataset </AddressCoordinateReferenceSystemAuthority> <AddressCoordinateReferenceSystemID>2893 </AddressCoordinateReferenceSystemID> </pre>

	</AddressCoordinateReferenceSystem>
QualityMeasures	Pattern Sequence Measure
QualityNotes	

2.3.3 Address Parcel IDs

2.3.3.1 Address Parcel Identifier Source

Element Name	AddressParcelIdentifierSource
Other common names for this element	
Definition	The permanent identifier for the agency, organization, or jurisdiction that assigns and maintains the Address Parcel Identifier.
Definition source	FGDC, May 2008. "Geographic Information Framework Data Content Standard Part 1: Cadastral." Section 4.7.
Data Type	characterString
Existing Standards for this Element	None.
Domain of Values for this Element	None.
Source of Values	None.
How Defined (eg, locally, from standard, other)	By local government (typically county government) law or administrative procedure, as governed by state law.
Example	Chester County (PA) Tax Assessment Department Bureau of Land Records Wake County (NC) Revenue Department Delaware County (OH) Auditor's Office
Notes/Comments	<ol style="list-style-type: none"> 1. The Address Parcel Identifier Source designates the agency, organization, or jurisdiction that assigns and maintains the Address Parcel Identifier. 2. If known, give the full name of the agency (department, office, etc.) rather than just the jurisdiction name. 3. In giving a jurisdiction name, if possible follow known naming

	standards, such as the ANSI (formerly FIPS) names or codes for states and counties, or GNIS names or codes for minor civil divisions, populated places, and other features.
XML Tag	< AddressParcelIdentifierSource >
XML Model	<pre> <xsd:simpleType name="AddressParcelIdentifierSource_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType> </pre>
XML Example	<AddressParcelIdentifierSource>Wake County (NC) Revenue Department </AddressParcelIdentifierSource>
Quality Measures	Tabular Domain Measure
Quality Notes	

2.3.3.2 Address Parcel Identifier

Element Name	AddressParcelIdentifier
Other common names for this element	Parcel Identifier Number, PIN number
Definition	The primary permanent identifier, as defined by the Address Parcel Identifier Source, for a parcel that includes the land or feature identified by an address. A parcel is "a single cadastral unit, which is the spatial extent of the past, present, and future rights and interests in real property."
Definition source	For "parcel identifier": Adapted from FGDC, May 2008. "Geographic Information Framework Data Content Standard Part 1: Cadastral." Section 4.2. For "parcel": FGDC, May 2008. "Cadastral Data Content Standard for the National Spatial Data Infrastructure." Version 1.4 – Fourth Revision. p. 45. (Part 3.2 "Parcel")
Data Type	characterString
Existing Standards for this Element	Determined by local ordinance or procedure, or in some cases by state law.

Domain of Values for this Element	Determined by local procedure.
Source of Values	Address Parcel Identifier Source
How Defined (eg, locally, from standard, other)	By local procedure, as it may be governed by local ordinance or state law.
Example	5142301020000 (= the address identifies the land or a feature within parcel 5142301020000) 07660254993-000 (= the address identifies the land or a feature within parcel 07660254993-000) 176-N-075 (= the address identifies the land or a feature within parcel 176-N-075)
Notes/Comments	<ol style="list-style-type: none"> 1. Parcels and addresses are created independently of each other. Some addresses locate features on one parcel only, and some addresses locate features that encompass multiple parcels. There are addresses that locate features that are not on tax parcels, but that are on ownership parcels such as federally-managed lands or public rights of way. Conversely there are parcels that have no address at all, parcels that have one address, and parcels that have many addresses (e.g. large parcels that front on or encompass more than one thoroughfare). 2. Thus no specific address-parcel relationship can be assumed. Addresses and parcels should be treated as independent of each other, and the relationship between should be treated, in relational database terms, as a many-to-many relationship. By providing an Address Parcel Identifier and an Address Parcel Identifier Source, the address standard provides a means to link an address with any number of parcels, and to link a parcel with any number of addresses. 3. The Address Parcel Identifier corresponds to the Parcel ID element in the Cadastral Standard. The Parcel ID is the primary key that identifies each record or occurrence in the Parcel entity. That, plus the Address Parcel Identifier Source, are the only parcel elements included or needed within the address standard. All other parcel elements are defined within the Cadastral Standard and need not be repeated here.
XML Tag	<pre>< AddressParcelIdentifier ></pre>
XML Model	<pre><xsd:simpleType name="AddressParcelIdentifier_type"></pre>

	<xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType>
XML Example	<AddressParcelIdentifier>07660254993-000</AddressParcelIdentifier>
Quality Measures	Uniqueness Measure Pattern Sequence Measure
Quality Notes	

2.3.4 Address Transportation Feature IDs

2.3.4.1 Address Transportation System Name

Element Name	AddressTransportationSystemName
Other common names for this element	Street centerline file, road network file, street network file, centerline network file
Definition	The name of the transportation base model to which the address is related.
Data Type	characterString
Existing Standards for this Element	<ol style="list-style-type: none"> There are no standards specifically for naming specific transportation base models. The content requirements for transportation base models are set forth in: U.S. Federal Geographic Data Committee, "Framework Data Content Standard Part 7: Transportation base." The Transportation base part is extended by the "Framework Data Content Standard Part 7c: Roads," which sets forth the requirements for road system models. The Framework Data Content Standard Part 7: Transportation is incorporated into this standard by reference.
Domain of Values for this Element	None.
Source of Values	None.
How Defined (eg, locally, from	By Address Transportation System Authority

standard, other)	
Example	DC Street Spatial Data Base TIGER/MAF File
Notes/Comments	<ol style="list-style-type: none"> 1. The Transportation Standard base part "defines the data model for describing transportation systems components of transportation systems for the modes [Roads, rail, inland waterways, and transit] that compose the Transportation theme of the NSDI." ("Framework Data Content Standard Part 7: Transportation base", Section 1, "Scope."). 2. All thoroughfare addresses, by definition, are located by reference to a thoroughfare--that is, by reference to a component of the transportation system. In addition, many landmark addresses and some postal addresses may also be so located, by virtue of alias addresses, road frontages, etc. 3. To make explicit the relationship between addresses and transportation networks, to provide a foundation for Address Reference Systems, and to strengthen address data quality testing, the "Framework Data Content Standard Part 7: Transportation" is incorporated by reference into this standard. 4. A thoroughfare is defined in Part 2: Street Address Data Classification as follows: "...a road or other access route by which the addressed feature can be reached... A thoroughfare is typically but not always a road - it may be, for example, a walkway, a railroad, or a river. Most Address Reference Systems pertain only to road systems--addresses are rarely assigned along rail lines or waterways. 5. Where only roads are of concern, reference should also be made to the "Framework Data Content Standard Part 7c: Roads," which extends the Transportation Standard base part.
XML Tag	< AddressTransportationSystemName >
XML Model	<pre> <xsd:simpleType name="AddressTransportationSystemName_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType> </pre>
XML Example	<AddressTransportationSystemName>TIGER/MAF File</AddressTransportationSystemName>
Quality Measures	Tabular Domain Measure

Quality Notes	
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2.3.4.2 Address Transportation System Authority

Element Name	AddressTransportationSystemAuthority
Other common names for this element	Department of Transportation, Public Works Department, Roads Department, etc.
Definition	The authority that maintains the transportation base model specified by the Address Transportation System Name, and assigns Address Transportation Feature IDs to the features it represents.
Data Type	characterString
Existing Standards for this Element	None.
Domain of Values for this Element	None.
Source of Values	None.
How Defined (eg, locally, from standard, other)	NA
Example	District of Columbia Department of Transportation (Street Spatial Data Base) U.S. Census Bureau (TIGER/MAF file)
Notes/Comments	The authority is typically the office or agency responsible for opening, maintaining, and closing the transportation features represented in the transportation base model. In some cases, the data model may be maintained by a federal agency or a private-sector firm.
XML Tag	<AddressTransportationSystemAuthority>
XML Model	<pre><xsd:simpleType name="AddressTransportationSystemAuthority _type"> <xsd:restriction base="xsd:string"></pre>

	<pre><xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><AddressTransportationSystemAuthority> District of Columbia Department of Transportation</AddressTransportation SystemAuthority></pre>
Quality Measures	Tabular Domain Measure
Quality Notes	

2.3.4.3 Address Transportation Feature Type

Element Name	AddressTransportationFeatureType
Other common names for this element	Point, centroid; node, intersection; line, arc, segment, edge; path, route
Definition	The type of transportation feature (TranFeature) used to represent an address.
Data Type	characterString
Existing Standards for this Element	For transportation features generally: U.S. Federal Geographic Data Committee, "Framework Data Content Standard Part 7: Transportation base." For roads features only: U.S. Federal Geographic Data Committee, "Framework Data Content Standard Part 7: Transportation base," as extended by "Framework Data Content Standard Part 7c: Roads."
Domain of Values for this Element	For transportation features generally: Point event, linear event, transportation point (TranPoint), transportation segment (TranSeg), or transportation path (TranPath) For road features only: RoadPointFeatureEvent, RoadLinearFeatureEvent, RoadPoint, RoadSeg, or RoadPath
Source of Values	U.S. Federal Geographic Data Committee, "Framework Data Content Standard Part 7: Transportation base." See especially Sections 5 (Terms and Definitions), and Section 7 (Requirements).
How Defined (eg, locally, from	For all transportation features: U.S. Federal Geographic Data Committee, "Framework Data Content Standard Part 7:

standard, other)	Transportation base." For road features: "Framework Data Content Standard Part 7c: Roads."
Examples	Point event: parcel centroid, building centroid, etc., located along a thoroughfare. Linear event: parcel frontage, building frontage, etc. located along a thoroughfare Transportation point: Any Intersection Address Transportation segment: A length of road between two intersecting roads (First Street between A Street and B Street) Transportation path: A length of including multiple segments (First Street from beginning to end)
Notes/Comments	<ol style="list-style-type: none"> 1. This element is meaningful only in the context of a transportation base model as defined in the FGDC's "Framework Data Content Standard Part 7." Transportation features are defined therein. 2. The type of transportation feature used to represent an address depends on: <ul style="list-style-type: none"> --a. the class of the address, and --b. (in some cases) how the address is mapped (i.e. as a point, line, or polygon). <p>These relationships are explained more fully in Appendix C (Section 3) of this standard.</p>
XML Tag	< AddressTransportationFeatureType >
XML Model	<pre> <xsd:simpleType name="AddressTransportationFeatureType_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType> </pre>
XML Example	<AddressTransportationFeatureType>RoadPoint </AddressTransportationFeatureType>
Quality Measures	Address Completeness Measure Intersection Validity Measure Segment Directionality Consistency Measure XYCoordinate Completeness Measure XYCoordinate Spatial Measure
Quality Notes	

2.3.4.4 Address Transportation Feature ID

Element Name	AddressTransportationFeatureID
Other common names for this element	
Definition	The unique identifier assigned to the particular feature that represents an address within a transportation base model.
Data Type	characterString
Existing Standards for this Element	U.S. Federal Geographic Data Committee, "Framework Data Content Standard Part 7: Transportation base." "Framework Data Content Standard Part 7c: Roads,"
Domain of Values for this Element	Constrained by reference transportation base model.
Source of Values	Reference transportation base model.
How Defined (eg, locally, from standard, other)	Within reference transportation base model.
Example	9087456
Notes/Comments	<ol style="list-style-type: none"> 1. The reference transportation base model might identify addresses by their Address ID, or it might assign a different identifier within the transportation base model. 2. If a different identifier is assigned within the transportation base model, then the Address Transportation Feature ID will serve, within the scope of the address record, as a foreign key to the transportation base model.
XML Tag	<pre><AddressTransportationFeatureID></pre>
XML Model	<pre><xsd:simpleType name="AddressTransportationFeatureId_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><AddressTransportationFeatureID>9087456 </AddressTransportationFeatureID></pre>

Quality Measures	Pattern Sequence Measure Uniqueness Measure
Quality Notes	

2.3.4.5 Related Transportation Feature ID

Element Name	RelatedTransportationFeatureID
Other common names for this element	
Definition	The unique identifier assigned (within the reference transportation base model) to a transportation feature to which an address is related.
Data Type	characterString
Existing Standards for this Element	U.S. Federal Geographic Data Committee, "Framework Data Content Standard Part 7: Transportation base." "Framework Data Content Standard Part 7c: Roads."
Domain of Values for this Element	Constrained by reference transportation base model.
Source of Values	Reference transportation base model.
How Defined (eg, locally, from standard, other)	Within the reference transportation base model.
Example	786542
Notes/Comments	<p>1. Thoroughfare addresses (other than Intersection Addresses) are represented within a transportation base model as point events or linear events, each with a unique Address Transportation Feature ID. These point events and linear events may, in turn, be related to one or more transportation segments within the transportation base model. The transportation segment must have a Complete Street Name and an address range that includes the Complete Street Name and Complete Address Number of the address.</p> <p>2. The Related Transportation Feature ID provides the ID, as assigned within the transportation base model, of the related segment.</p>

	3. Intersection Addresses are related to one or more transportation points within the transportation data model. For Intersection Addresses, the TranPoint ID would be placed within theRelated Transportation Feature ID element.
XML Tag	<RelatedTransportationFeatureID>
XML Model	<pre><xsd:simpleType name="RelatedTransportationFeatureId_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<RelatedTransportationFeatureID>786542</RelatedTransportationFeatureID>
Quality Measures	Related Element Uniqueness Measure
Quality Notes	

2.3.5 Address Range Attributes

2.3.5.1 Address Range Type

Element Name	AddressRangeType
Other common names for this element	
Definition	<p>This attribute states whether an address range (either a Two Number Address Range or a Four Number Address Range) is actual or potential.</p> <p>Actual range: the low and high Complete Address Numbers are numbers that have been assigned and are in use along the addressed feature.</p> <p>Potential range: the low and high Complete Address Numbers are numbers that would be assigned if all possible numbers were in use along the addressed feature, and there were no gaps between the range and its preceding and following ranges.</p>
Definition Source	New
Data Type	characterString

Existing Standards for this Element	None
Domain of Values for this Element	Actual, Potential, Unknown
Source of Values	New
How Defined (eg, locally, from standard, other)	New
Example	Actual range
Notes/Comments	<p>1. Ranges may be actual or potential.</p> <p>2. Actual ranges give the lowest and highest Complete Address Numbers that have been assigned and are in use along the addressed featurem, excluding any addresses that are anomalies, especially with regard to parity or sequence.</p> <p>3. Potential (or theoretical) ranges include all the numbers that could be assigned along the addressed feature based on the Address Reference System Numbering Rules. Potential ranges permit no numbering gaps between the range and its preceding and following ranges. Potential ranges are equal to or broader than actual ranges.</p> <p>4. The Census Bureau uses theoretical ranges in its TIGER files, to ensure continuity from census to census. Potential ranges are also used in Googlemaps, Mapquest and other online road map and routing services, because they get their data originally from Census TIGER files.</p> <p>5. Theoretical ranges are useful for software, such as some computer aided emergency dispatching applications, that requires continuous ranges along the length of a street.</p> <p>6. Ranges are often used for geocoding, but point matches are preferable.</p> <p>7. When constructing actual ranges, the lowest assigned Address Number and the highest assigned Address Number in use along a given segment are used. However, noAddress Number which is an anomaly (as to range parity or side, or for any other reason) is to be used in constructing the actual address range.</p>
XML Tag	< AddressRangeType >
XML Model	<xsd:simpleType name="AddressRangeType_type">

	<pre><xsd:annotation> <xsd:documentation xml:lang="en"> This attribute states whether an address range (either a Two Number Address Range or a Four Number Address Range) is actual or potential. </xsd:documentation> </xsd:annotation> <xsd:restriction base="xsd:string"> <xsd:enumeration value="Actual" > <xsd:annotation> <xsd:documentation>the low and high Complete Address Numbers are numbers that have been assigned and are in use along the addressed feature. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="Potential" > <xsd:annotation> <xsd:documentation>The low and high Complete Address Numbers are numbers that would be assigned if all possible numbers were in use along the addressed feature, and there were no gaps between the range and its preceding and following ranges. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="Unknown" > <xsd:annotation> <xsd:documentation>The relationship between the low and high Complete Address Numbers and the addressed feature is unknown. </xsd:documentation> </xsd:annotation> </xsd:enumeration> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<AddressRangeType>Actual</AddressRangeType>
Quality Measures	Tabular Domain Measure
Quality Notes	

2.3.5.2 Address Range Parity

Element Name	AddressRangeParity
Other common names for this element	
Definition	The set of Address Number Parity values specified in the Address Reference System Numbering Rules for the Address Numbers in an address range.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Even, Odd, Both, None, Unknown
Source of Values	New
How Defined (eg, locally, from standard, other)	Odd - All Address Numbers in the range have an Address Number Parity of "odd" Even - All Address Numbers in the range have an Address Number Parity of "even" Both - Both even and odd Address Numbers are found in the range None - No Address Number is found within the range Unknown - The parity of the Address Numbers in the range is not known.
Examples	Odd - 101 - 199 Main Street Even - 100 - 198 Main Street Both - 100 - 199 Main Street None - (null) - (null) Main Street (no address numbers assigned to that specific segment)
Notes/Comments	<ol style="list-style-type: none"> 1. Odd and even Address Numbers are usually associated with opposite sides of a thoroughfare. For example, a jurisdiction may have rules within its Address Reference System Rules to consistently assign odd numbers to the "left" side of its thoroughfares and even numbers to the "right" side. (See Address Range Side for how "left" and "right" are defined). 2. The Address Range Parity is determined using the Address Reference System Numbering Rules. For theoretical type

	<p>ranges, the low and high numbers are the lowest and highest numbers of the identified parity found within the identified block within the Address Reference System. For actual ranges, the lowest and highest Address Number in use for the selected block are identified and used. Anomalous addresses (e.g., those Address Numbers that have a parity that is not the same as the Address Range Parity) are not used in creating the actual Address Range or in determining the Address Range Parity.</p> <ol style="list-style-type: none"> 3. The expected values for Address Range Parity depend on rules found in the Address Reference System Rules, and are associated with the Address Range Side. If the address range includes addresses from only one side of the thoroughfare, the Address Range Parity is typically but not always "odd" or "even". If the range covers both sides of the thoroughfare, then the Address Range Parity is typically "both" 4. Address ranges composed of milepost Complete Address Numbers (e.g., Milepost 21 - Milepost 24) by definition have a parity of "both". Milepost numbers denote distance only, not side of street. (For more information on milepost Complete Address Numbers, see Complete Address Number.) 5. If no addresses occur within a range, then the Address Range Parity is "None."
XML Tag	< AddressRangeParity >
XML Model	<pre> <xsd:simpleType name="AddressRangeParity_type"> <xsd:annotation> <xsd:documentation xml:lang="en"> The set of Address Number Parity values specified in the Address Reference System Numbering Rules for the Address Numbers in an address range. </xsd:documentation> </xsd:annotation> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> <xsd:enumeration value="even" > <xsd:annotation> <xsd:documentation> All Address Numbers in the range have an Address Number Parity of "even". </xsd:documentation> </xsd:annotation> </xsd:enumeration> </pre>

	<pre> <xsd:enumeration value="odd" > <xsd:annotation> <xsd:documentation> All Address Numbers in the range have an Address Number Parity of "odd". </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="both" > <xsd:annotation> <xsd:documentation> Both even and odd Address Numbers are found in the range. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="none" > <xsd:annotation> <xsd:documentation> No Address Number is found within the range. </xsd:documentation> </xsd:annotation></xsd:enumeration> <xsd:enumeration value="unknown" > <xsd:annotation> <xsd:documentation>The parity of the Address Numbers in the range is not known. </xsd:documentation></xsd:annotation> </xsd:enumeration> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<AddressRangeParity>odd</AddressRangeParity>
Quality Measures	Address Number Range Parity Consistency Measure
Quality Notes	

2.3.5.3 Address Range Side

Element Name	AddressRangeSide
Other common names for this element	
Definition	The side of a transportation segment (TranSeg) on which the address range is found (right, left or both).

Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	right, left, both, none, unknown
Source of Values	New
How Defined (eg, locally, from standard, other)	New
Example	Elm Street runs south-to-north. For each block, the from-node is at the south end, and the to-node is at the north end. "Right" and "left" are defined by standing at the south (from) end, and facing the north (to) end. The "right" side is in this case the east side, and the "left" side is the west side. (If the from- and to- nodes were reversed, "left" and "right" would also be reversed.)
Notes/Comments	<ol style="list-style-type: none"> Address Range Side has nothing to do with traffic flow or compass direction. Address Range Side states whether the range includes Complete Address Numbers on right side, left side, or both sides of the thoroughfare. "Right" and "left" must be defined by reference to a specific transportation segment (or set of segments) in a particular transportation network model. By definition, every transportation segment has a from-node at one end and a to-node at the other end. The directionality, right side, and left side of the segment are determined by standing at the from-node and facing the to-node. Address Left Right Measure and Address Range Directionality Measure provide tools for determining "left", "right" and directionality. Address Range Directionality can be defined only for a Two Number Address Range or a Four Number Address Range that has been related to a specific transportation segment (or set of segments) in a particular transportation network model. Use the Address Transportation System Name, Address Transportation System Authority, Address Transportation Feature Type, Address Transportation Feature ID, and Related Transportation Feature ID attributes to relate a

	<p>particular address range to a specific transportation segment (or set of segments) in a specific transportation network model. Transportation segments, and transportation network models generally, are defined and described in the FGDC's "Geographic Information Framework Data Content Standard Part 7: Transportation Base."</p>
XML Tag	<AddressRangeSide>
XML Model	<pre><xsd:simpleType name="AddressRangeSide_type"> <xsd:annotation> <xsd:documentation xml:lang="en"> The side of the transportation segment (right , left, both, none, unknown) on which the address range applies. </xsd:documentation> </xsd:annotation> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> <xsd:enumeration value="right" > <xsd:annotation> <xsd:documentation> The address is related to the right side of the street. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="left" > <xsd:annotation> <xsd:documentation> The address is realted to the left side of the street. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="both"> <xsd:annotation> <xsd:documentation> The address pertains to both sides of the street. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="none" > <xsd:annotation> <xsd:documentation>The address is not on either or both sides of the street or the</pre>

	<p>concept of side of street does not apply to the address.</p> <p>For instance an intersection address would have an Address Side Of Street of none.</p> <pre></xsd:documentation> </xsd:annotation></xsd:enumeration> <xsd:enumeration value="unknown"> </xsd:enumeration> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<AddressRangeSide>left</AddressRangeSide>
Quality Measures	Left Right Odd Even Parity Measure Address Left Right Measure
Quality Notes	Note that this measure checks the agreement of a an Address Range Side attribute with geometry, while Left Right Odd Even Parity Measure checks the agreement of an Address Number against an established local rule for associating address parity with the right or left side of the street when traveling away from the governing Address Reference System Axis Point Of Beginning.

2.3.5.4 Address Range Directionality

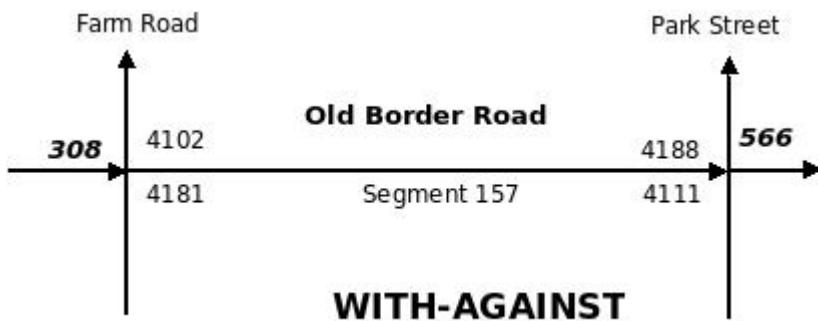
Element Name	AddressRangeDirectionality
Other common names for this element	
Definition	Whether the low Complete Address Number of an address range is closer to the from-node or the to-node of the transportation segment(s) that the range is related to.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	With - The low address is nearer the from-node; numbers ascend toward the to-node. Against - The low address is nearer the to-node; numbers descend

	<p>toward the to-node.</p> <p>With-Against - The numbers run in opposite directions on either side of the street. The low number on the left side is nearer the from-node. The low number on the right side is nearer the to-node.</p> <p>Against-With - The numbers run in opposite directions on either side of the street. The low number on the left side is nearer the to-node. The low number on the right side is nearer the from-node.</p> <p>Null - The address range has null values for the high and low Complete Address Numbers.</p> <p>NA - Does not apply (transportation segment directionality is inconsistent within the range).</p> <p>Unknown - The address range directionality is not known.</p>
Source of Values	New
How Defined (eg, locally, from standard, other)	New
Example	<p>Smalltown has a digital street centerline network model. Each street is mapped as a series of segments that run from one intersection to another.</p> <p>1. With: Segment 1 represents Main Street from First Street to Second Street. It runs from Node 1 to Node 2. (That is, From-node = Node 1; To-node = Node 2). Node 1 = Main and First; Node 2 = Main and Second. The Four Number Address Range along this segment is 100 - 198; 101 - 199 Main Street. 100 Main and 101 Main are both near Node 1 (First and Main); the high numbers are near Main and Second. The Address Range Directionality for this Four Number Address Range is With the segment directionality.</p>  <p style="text-align: center;">WITH</p> <p>2. Against: Segment 25 represents Elm Street from Oak Street to Pine Street. Segment 25 From-node = Node 92; To-node = Node</p>

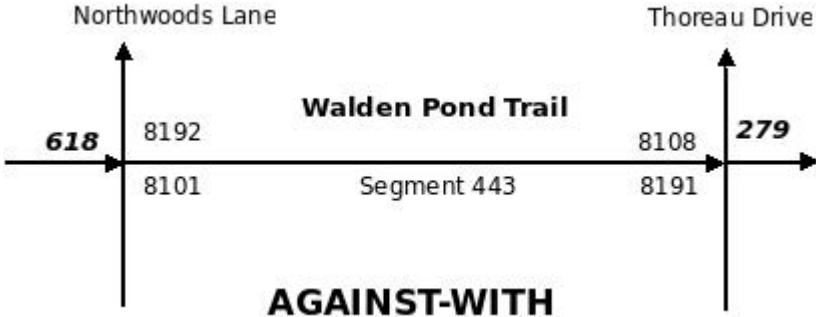
77. Node 92 = Elm and Oak; Node 77 = Elm and Pine. The Four Number Address Range along this segment is 110 - 180; 111 - 187 Elm Street. 110 Elm and 111 Elm are both near Node 77 (Elm and Pine); the high numbers are near Elm and Oak. The Address Range Directionality for this Four Number Address Range is **Against** the segment directionality.



3. **Special Case: With - Against:** Segment 157 is unusual--the address numbers run in different directions on each side of the street. Segment 157 represents Old Border Road from Farm Road to Park Street. Segment 157 From-node = Node 308; To-node = Node 566. Node 308 = Old Border and Farm; Node 566 = Old Border and Park. The Four Number Address Range along this segment is 4102 - 4188; 4111 - 4181 Old Border Road. 4102 Old Border and 4181 Old Border are both near Node 308 (Old Border and Farm). 4188 Old Border and 4111 Old Border are both near Node 566 (Old Border and Park). The Address Range Directionality for this Four Number Address Range is **With - Against** the segment directionality.



4. **Special Case: Against - With:** This is the reverse of the previous case. Segment 443 also has address numbers that run in different directions on each side of the street. Segment 443 represents Walden Pond Trail from Northwoods Lane to Thoreau Drive. Segment 443 From-node = Node 618; To-node =

	<p>279. Node 618 = Walden Pond Trail and Northwoods Lane, and Node 279 = Walden Pond Trail and Thoreau Drive. The Four Number Address Range along this segment is 8108 - 8192; 8101 - 8191. 8192 Walden Pond Trail and 8101 Walden Pond Trail are near Node 618 (Walden Pond Trail and Northwoods Lane) while 8108 Walden Pond Trail and 8191 Walden Pond Trail are near Node 279 (Walden Pond Trail and Thoreau Drive). The Address Range Directionality for this Four Number Address Range is Against - With the segment directionality.</p> 
Notes/Comments	<ol style="list-style-type: none">1. Address Range Directionality has nothing to do with traffic flow or compass direction.2. Address Range Directionality states whether the Complete Address Numbers ascend or descend as one proceeds from the from-node to the to-node of the transportation segments (TranSeg(s)) to which the range is related.3. Address Range Directionality can be defined only for a Two Number Address Range or a Four Number Address Range that has been related to a specific TranSeg (or set of TranSegs) in a particular transportation network model.4. By definition, TranSegs have a from-node and a to-node, which determine the TranSeg's directionality, right side, and left side.5. If the low Complete Address Number of a range is closer to the from-node, and the high Complete Address Number is closer to the to-node, then the Complete Address Numbers ascend With the TranSeg directionality.6. If the low Complete Address Number of a range is closer to the to-node, and the high Complete Address Number is closer to the from-node, then the Complete Address Numbers ascend Against the TranSeg directionality.7. If the low and high Complete Address Numbers of a range are equal, or equidistant from the from-node and to-node, or if the from-node and the to-node are the same (a loop), then by definition the Complete Address Numbers are considered to ascend With the Tran Seg directionality.8. If the two ranges of a Four Number Address Range have

	<p>different Address Range Directionality, then give the left range directionality first, followed by the right range directionality: "With - Against" or "Against - With."</p> <p>9. Special values apply in the following cases:</p> <ul style="list-style-type: none">---Null - the address range contains null values.---Unknown - the range directionality (or the relative locations of the low and high Complete Address Numbers) is unknown.---NA (not applicable) - the range covers multiple TranSegs, and the TranSegs have inconsistent segment directionality. <p>10. Use the Address Transportation System Name, Address Transportation System Authority, Address Transportation Feature Type, Address Transportation Feature ID, and Related Transportation Feature ID attributes to relate a particular address range to a specific transportation segment (or set of segments) in a specific transportation network model. TranSegs, and transportation network models generally, are defined and described in the FGDC's "Geographic Information Framework Data Content Standard Part 7: Transportation Base."</p>
XML Tag	< AddressRangeDirectionality >
XML Model	<xsd:simpleType name="AddressRangeDirectionality_type"> <xsd:annotation> <xsd:documentation xml:lang="en"> Whether the low Complete Address Number of an address range is closer to the from-node or the to-node of the transportation segment(s) that the range is related to. </xsd:documentation> </xsd:annotation> <xsd:restriction base="xsd:string"> <xsd:enumeration value="With"> <xsd:annotation> <xsd:documentation>The low address is nearer the from-node; numbers ascend toward the to-node. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="Against"> <xsd:annotation> <xsd:documentation>The low address is nearer the to-node; numbers descend toward the to-node. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="With-Against">

```
<xsd:annotation>
<xsd:documentation>The numbers run in opposite
directions on either side of the street. The
low number on the left side is nearer the from-
node. The low number on the right side is
nearer the to-
node.</xsd:documentation></xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Against-With">
<xsd:annotation>
<xsd:documentation>The numbers run in opposite
directions on either side of the street. The
low number on the left side is nearer the to-
node. The low number on the right side is
nearer the from-node.
</xsd:documentation>
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Null">
<xsd:annotation>
<xsd:documentation>The address range has null
values for the high and low Complete Address
Numbers.
</xsd:documentation>
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="NA">
<xsd:annotation>
<xsd:documentation>Does not apply (transportation
segment directionality is inconsistent within
the range).
</xsd:documentation>
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Unknown">
<xsd:annotation>
<xsd:documentation>The address range
directionality is not known.
</xsd:documentation>
</xsd:annotation>
</xsd:enumeration>
</xsd:restriction>
</xsd:simpleType>
```

XML Example	<AddressRangeDirectionality>With- Against</AddressRangeDirectionality>
Quality Measures	Address Range Directionality Measure
Quality Notes	

2.3.5.5 Address Range Span

Element Name	AddressRangeSpan
Other common names for this element	
Definition	Whether an address range covers part of a transportation segment, one segment, multiple segments, or the entire thoroughfare within the Address Reference System Extent.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Partial Segment, Single Segment, Multi Segments, Entire Street (within a given Address Reference System Extent), Unknown. Other values may be defined locally.
How Defined (eg, locally, from standard, other)	New
Example	<p>Oak Street is four blocks long. Each block is represented as a single transportation segment. Each block has a different hundred range: 1-99, 100-199, 200-299, 300-399. On the first block, a small strip shopping center with a single entrance has storefronts with Complete Address Numbers 2-42. Address Range Spans for following address ranges would be:</p> <ul style="list-style-type: none"> 1. 2 -42 Oak Street Address Range Span = Partial block 2. 200- 299 Oak Street Address Range Span = Single block 3. 100- 299 Oak Street Address Range Span = Multi-block 4. 1 - 399 Oak Street Address Range Span = Entire street
Notes/Comments	<ol style="list-style-type: none"> 1. Address Range Span states whether an address range covers part of a transportation segment, one segment, multiple segments, or the entire thoroughfare within the Address Reference System Extent. 2. Address Range Span indicates the nature and extent of the geometric features that the range is associated with. It might cover a single building, a portion of a street segment, a full street segment (the most common way in which a range is used), a group of segments, or entire street within a jurisdiction. The latter two categories are often used in E-

	<p>911 applications where the entire range of addresses found in a single Emergency Service Zone is used.</p> <p>3. Address Range Span can be defined only for a Two Number Address Range or a Four Number Address Range that has been related to a specific transportation segment (or set of segments) in a particular transportation network model.</p> <p>4. Use the Address Transportation System Name, Address Transportation System Authority, Address Transportation Feature Type, Address Transportation Feature ID, and Related Transportation Feature ID attributes to relate a particular address range to a specific transportation segment (or set of segments) in a specific transportation network model. Transportation segments, and transportation network models generally, are defined and described in the FGDC's "Geographic Information Framework Data Content Standard Part 7: Transportation Base."</p>
XML Tag	<AddressRangeSpan>
XML Model	<pre> <xsd:simpleType name="AddressRangeSpan_type"> <xsd:annotation> <xsd:documentation xml:lang="en"> Whether an address range covers part of a transportation segment, one segment, multiple segments, or the entire thoroughfare within the Address Reference System Extent. </xsd:documentation> </xsd:annotation> <xsd:restriction base="xsd:string"> <xsd:enumeration value="Partial Segment"> </xsd:enumeration> <xsd:enumeration value="Single Segment"> </xsd:enumeration> <xsd:enumeration value="Multi Segment"> </xsd:enumeration> <xsd:enumeration value="Entire Street"> </xsd:enumeration> <xsd:enumeration value="Unknown"> </xsd:enumeration> <xsd:pattern value=".+"> </xsd:pattern> </xsd:restriction> </xsd:simpleType> </pre>
XML Example	<AddressRangeSpan>Entire Street</AddressRangeSpan>

Quality Measures	Tabular Domain Measure
Quality Notes	

2.3.6 Address Attributes

2.3.6.1 Address Classification

Element Name	AddressClassification
Other common names for this element	Address Type, Address Class
Definition	The class of the address as defined in the Classification Part of this standard.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	The Classification Part of this standard.
Domain of Values for this Element	Class names given in the Classification Part of this standard.
Source of Values	The Classification Part of this standard.
How Defined (eg, locally, from standard, other)	In the Classification Part of this standard.
Examples	Numbered Thoroughfare Address Intersection Address Two Number Address Range Four Number Address Range Unnumbered Thoroughfare Address Landmark Address Community Address USPSPostal Delivery Box USPSPostal Delivery Route USPSGeneral Delivery Office General Address Class

Notes/Comments	Address classes are defined and described in the Classification part of this standard.
XML Tag	<AddressClassification></AddressClassification>
XML Model	<pre> <xsd:simpleType name="AddressClassification_type"> <xsd:restriction base="xsd:string"> <xsd:enumeration value="NumberedThoroughfareAddress"> </xsd:enumeration> <xsd:enumeration value="IntersectionAddress"> </xsd:enumeration> <xsd:enumeration value="TwoNumberAddressRange"></xsd:enumeration> <xsd:enumeration value="FourNumberAddressRange"></xsd:enumeration> <xsd:enumeration value="UnnumberedThoroughfareAddress"> </xsd:enumeration> <xsd:enumeration value="LandmarkAddress"></xsd:enumeration> <xsd:enumeration value="CommunityAddress"> </xsd:enumeration> <xsd:enumeration value="USPSPostalDeliveryBox"></xsd:enumeration> <xsd:enumeration value="USPSPostal Delivery Route"></xsd:enumeration> <xsd:enumeration value="USPSGeneral Delivery Office"></xsd:enumeration> <xsd:enumeration value="GeneralAddressClass"></xsd:enumeration> </xsd:restriction> </xsd:simpleType> </pre>
XML Example	<AddressClassification>IntersectionAddress</AddressClassification>
Quality Measures	Tabular Domain Measure Pattern Sequence Measure
Quality Notes	The Tabular Domain Measure checks on whether a classification entry actually exists. The Pattern Sequence Measure can be used to check whether the entry associated with the classification matches its description.

2.3.6.2 Address Feature Type

Element Name	Address Feature Type
Other common names for this element	
Definition	A category of real world phenomena with common properties whose location is specified by an address.
Definition Source	Adapted from FGDC Framework Data Content Standard, Part 0: Base Document, Section 5.22
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	May be created locally
Source of Values	Local
How Defined (eg, locally, from standard, other)	Locally
Example	Parcel, building, building entrance, service entrance, subaddress, power pole, cell tower
Notes/Comments	Initial list of feature types: Block, block face, intersection, parcel, building, entrance, and subaddress. The list might be expanded indefinitely to include infrastructure and other features. An address may designate multiple Address Feature Types.
XML Tag	<AddressFeatureType>
XML Model	<pre> <xsd:simpleType name="AddressFeatureType_type"> <xsd:annotation> <xsd:documentation xml:lang="en"> The type of feature identified by the address Initial list of feature types: Building Utility Cabinet, Telephone Pole, Building, Street block, street block </pre>

	<p>face, intersection, parcel, building, entrance, unit.</p> <p>The list might be expanded indefinitely to include infrastructure and other features.</p> <pre></xsd:documentation> </xsd:annotation> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<AddressFeatureType>Cell Tower</AddressFeatureType>
Quality Measures	Tabular Domain Measure Address Reference System Rules Address Completeness Measure
Quality Notes	Address Feature Type elements may be defined in the Address Reference System Rules, and should be checked there. Address Completeness Measure checks whether all the addressable objects have assigned addresses.

2.3.6.3 Address Lifecycle Status

Element Name	Address Lifecycle Status
Other common names for this element	
Definition	The lifecycle status of the address.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Potential = Address falls within a theoretical range (See Address Range Type), but has never been used; Proposed = Application pending for use of this address (e.g., address tentatively issued for subdivision plat that is not yet fully approved); Active = Address has been issued and is in use; Retired = Address was issued, but is now obsolete (e.g. street name has been changed, building was demolished, etc.)

Source of Values	New
How Defined (eg, locally, from standard, other)	From this standard
Notes/Comments	<p>1. An address should be assigned as early as possible in the development process, generally upon subdivision or issuance of the initial building permit. Long before occupancy, a site may require construction deliveries, emergency services, or mention in official records, all of which are facilitated if the address is assigned and known.</p> <p>2. An address, once issued, should not be deleted from the records, even if it falls out of use. If an address becomes obsolete, its status should be changed from "active" to "retired".</p>
XML Tag	<pre><AddressLifecycleStatus></pre>
XML Model	<pre><xsd:simpleType name="AddressLifecycleStatus_type"> <xsd:annotation> <xsd:documentation xml:lang="en"> The life cycle status of the address. </xsd:documentation> </xsd:annotation> <xsd:restriction base="xsd:token"> <xsd:enumeration value="Potential" > <xsd:annotation> <xsd:documentation> Address falls within a theoretical range, but has never been used. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="Proposed" > <xsd:annotation> <xsd:documentation> Application pending for use of this address (e.g., address tentatively issued for subdivision plat that is not yet fully approved). </xsd:documentation> </xsd:annotation> </xsd:enumeration></pre>

	<pre> <xsd:enumeration value="Active" > <xsd:annotation> <xsd:documentation> Address has been issued and is in use. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="Retired" > <xsd:annotation> <xsd:documentation> Address was issued, but is now obsolete (e.g. street name has been changed), building was demolished, etc. </xsd:documentation> </xsd:annotation> </xsd:enumeration> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<AddressLifecycleStatus>Proposed</AddressLifecycleStatus>
Quality Measures	Tabular Domain Measure Address Lifecycle Status Date Consistency Measure
Quality Notes	Each locality will have records describing conditions associated with a given lifecycle status. While the nature of these records and methods for checking correspondence with Address Lifecycle Status entries are beyond the scope of the standard, they may be considered in a local quality program.

2.3.6.4 Official Status

Element Name	Official Status
Other common names for this element	Official address, legal address, alias address, alternate address, variant address
Definition	Whether the address, street name, landmark name, or place name is as given by the official addressing authority (official), or an alternate or alias (official or unofficial), or a verified error.
Definition Source	New
Data Type	characterString
Existing Standards	No

for this Element	
Domain of Values for this Element	<ol style="list-style-type: none"> 1. Official 2. Alternate or Alias <ul style="list-style-type: none"> ---2.1 Official Alternate or Alias <ul style="list-style-type: none"> -----2.1.1 Alternate Established by an Official Renaming Action of the Address Authority -----2.1.2 Alternates Established by an Address Authority ---2.2 Unofficial Alternate or Alias <ul style="list-style-type: none"> -----2.2.1 Alternate Established by Colloquial Use -----2.2.2. Unofficial Alternate in Frequent Use -----2.2.3. Unofficial Alternate in Use by Agency or Entity -----2.2.4. Posted or Vanity Address 3. Verified Invalid
Source of Values	New
How Defined (eg, locally, from standard, other)	New
Example	See notes below.
Notes/Comments	<p>1. Official The address or name as designated by the Address Authority.</p> <p>2. Alternate or Alias An alternate or alias to the official address or name that is also in official or popular use. The Related Address ID can be used to link an alternate or alias to the Address ID of the official address. There are two types of alternate or alias names, official and unofficial, each of which has subtypes.</p> <p>2.1 Official Alternate or Alias: These are alternate names designated by an official Address Authority. Subtypes include, but are not limited to:</p> <ul style="list-style-type: none"> * <u>Official Renaming Action of the Address Authority</u> An Address Authority may replace one address or name with another, e.g. by renaming or renumbering. The prior, older address should be retained as an alias, to provide for conversion to the new address. * <u>Alternates Established by an Address Authority</u> An Address Authority may establish a name or number to be used in addition to the official address or name. For example, a state highway designation (State Highway 7) may be given to a locally-named road, or a memorial name may be applied to an existing street by posting an additional sign, while the

	<p>local or original name and addresses continue to be recognized as official.</p> <p>2.2 Unofficial Alternate or Alias: These are addresses or names that are used by the public or by an individual, but are not recognized as official by the Address Authority: Some examples include, but are not limited to:</p> <ul style="list-style-type: none">* _Alternates Established by Colloquial Use in a Community_ An address or name that is in popular use but is not the official name or an official alternate or alias.* _Unofficial Alternates Frequently Encountered_ In data processing, entry errors occur. Such errors if frequently encountered may be corrected by a direct match of the error and a substitution of a correct name.* _Unofficial Alternates In Use by an Agency or Entity_ For data processing efficiency, entities often create alternate names or abbreviations for internal use. These must be changed to the official form for public use and transmittal to external users.* _Posted or Vanity Address_ An address that is posted, but is not recognized by the Address Authority (e.g. a vanity address on a building); <p>3. Verified Invalid An address that has been verified as being invalid, but which keeps appearing in address lists. Different from Unofficial Alternate Names in that these addresses are known not to exist.</p>
XML Tag	< OfficialStatus >
XML Model	<xsd:simpleType name="OfficialStatus_type"> <xsd:annotation> <xsd:documentation xml:lang="en"> Whether the address, street name, landmark name, or place name is as given by the official addressing authority (official), or an alternate or alias (official or unofficial), or a verified error. </xsd:documentation> </xsd:annotation> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> <xsd:enumeration value="Official" > <xsd:annotation> <xsd:documentation>

The address or name as designated by the Address Authority.

```
</xsd:documentation>
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Alternate or Alias" >
<xsd:annotation>
<xsd:documentation>
```

An alternate or alias to the official address or name that is also in official or popular use.

The Related Address ID can be used to link an alternate or alias to the Address ID of the official address. There are two types of alternate or alias names, official and unofficial, each of which has subtypes.

```
</xsd:documentation>
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Official Alternate or
Alias" >
<xsd:annotation>
<xsd:documentation>
```

These are alternate names designated by an official Address Authority.

```
</xsd:documentation>
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Official Renaming
Action of the Address Authority" >
<xsd:annotation>
<xsd:documentation>An Address Authority may replace one address or name with another, e.g. by renaming or renumbering. The prior, older address should be retained as an alias, to provide for conversion to the new address.</xsd:documentation></xsd:annotation>
```

</xsd:enumeration>

```
<xsd:enumeration value="Alternates Established
by an Address Authority" >
<xsd:annotation>
<xsd:documentation>An Address Authority may establish a name or number to be used in addition to the official address or name. For example, a state highway designation (State Highway 7) may be given to a locally-named road, or a memorial name may be applied to an existing street by posting an additional sign, while the local or original name and addresses continue to be recognized as official.</xsd:documentation></xsd:annotation>
```

```
>
</xsd:enumeration>
<xsd:enumeration value="Unofficial Alternate or
    Alias" >
<xsd:annotation>
<xsd:documentation>
These are addresses or names that are used by
    the public or by an individual, but are not
recognized as official by the Address
    Authority.
</xsd:documentation>
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Alternate Names
    Established by Colloquial Use in a Community" >
    >
<xsd:annotation>
<xsd:documentation>An address or name that is
    in popular use but is not the official name
    or an official alternate or alias.
    </xsd:documentation></xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Unofficial Alternate
    Names Frequently Encountered" >
<xsd:annotation>
<xsd:documentation>In data processing, entry
    errors occur. Such errors if frequently
    encountered may be corrected by a direct
    match of the error and a substitution of a
    correct name.
</xsd:documentation>
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Unofficial Alternate
    Names In Use by an Agency or Entity" >
<xsd:annotation>
<xsd:documentation>For data processing
    efficiency, entities often create alternate
    names or abbreviations for internal use.
    These must be changed to the official form
    for public use and transmittal to external
    users.
</xsd:documentation>
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Posted or Vanity
    Address" >
<xsd:annotation>
<xsd:documentation>An address that is posted,
    but is not recognized by the Address
    Authority (e.g. a vanity address on a
```

	<pre> building);</xsd:documentation> </xsd:annotation></xsd:enumeration> <xsd:enumeration value="Verified Invalid" > <xsd:annotation> <xsd:documentation> An address that has been verified as being invalid, but which keeps appearing in address lists. Different from Unofficial Alternate Names in that these addresses are known not to exist. </xsd:documentation> </xsd:annotation> </xsd:enumeration> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<OfficialStatus>Official Renaming Action of the Address Authority</OfficialStatus>
Quality Measures	Tabular Domain Measure Official Status Address Authority Consistency Measure
Quality Notes	Each locality will have records describing conditions associated with a given Official Status. While the nature of these records and methods for checking correspondence between entries are beyond the scope of the standard, they may be considered in a local quality program.

2.3.6.5 Address Anomaly Status

Element Name	Address Anomaly Status
Other common names for this element	
Definition	A status flag, or an explanatory note, for an address that is not correct according to the Address Reference System that governs it, but is nonetheless a valid address.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	No
Domain of Values?	May be "yes" or "no", or may be an enumerated domain of

	anomaly types
How Defined (eg, locally, from standard, other)	Locally
Example	An address that has an even Address Number Parity but is located on the odd-numbered side of the street.
Notes/Comments	This field may be used to identify the type of anomaly (e.g. wrong parity, out of sequence, out of range, etc.) rather than simply whether or not it is anomalous. Local jurisdictions may create specific categories for anomalies.
XML Tag	<AddressAnomalyStatus>
XML Model	<pre><xsd:simpleType name="AddressAnomalyStatus_type"> <xsd:restriction base="xsd:string"></xsd:restriction> </xsd:simpleType></pre>
XML Example	<AddressAnomalyStatus>yes</AddressAnomalyStatus>
Quality Measures	Tabular Domain Measure
Quality Notes	Validation tests for conditions described Address Anomaly Status values are entirely dependent on local conditions, and are beyond the scope of this standard. Some of the measures described in the standards may provide complete or partial solutions.

2.3.6.6 Address Side Of Street

Element Name	AddressSideOfStreet
Other common names for this element	
Definition	The side of the transportation segment (right , left, both, none, unknown) on which the address is located.
Data Type	characterString
Existing Standards for this Element	U.S. Federal Geographic Data Committee, "Framework Data Content Standard Part 7: Transportation base," sections 7.3.2

	and B.3.6
Domain of Values for this Element	right, left, both, none, unknown
Source of Values	
How Defined (eg, locally, from standard, other)	U.S. Federal Geographic Data Committee, "Framework Data Content Standard Part 7: Transportation base," Annex B.
Example	See domain of values above.
Notes/Comments	<ol style="list-style-type: none"> 1. "Left" and "right" are defined by reference to the direction of the transportation segment to which the address is related. "The direction of a TranSeg is determined by its "from" and "to" TranPoints" (Transportation base standard, section 7.3.2). "Left" and "right" are defined by facing the "to" TranPoint. 2. Most addresses are located to the left or right of the segment. The value of "none" can be used only for Intersection Addresses, which by definition occur at the point of intersection of two or more street segments. An Intersection Address begins or ends a segment and so is not on either side of it. 3. If an addressed feature straddles the thoroughfare to which it is addressed (a rare occurrence but it does happen), it should be given the Address Side Of Street value that corresponds to the correct side for the number that was assigned to the feature. 4. Address Side Of Street does not apply to address ranges. Use the the Address Range Side attribute to give the side of a Two Number Address Range or a Four Number Address Range.
XML Tag	<AddressSideOfStreet>
XML Model	<pre> <xsd:simpleType name="AddressSideOfStreet_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> <xsd:enumeration value="right" > <xsd:annotation> <xsd:documentation> The address is related to the right side of the street. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="left" > <xsd:annotation> </pre>

	<pre> <xsd:documentation> The address is realted to the left side of the street. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="both" > <xsd:annotation> <xsd:documentation> The address pertains to both sides of the street. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="none" > <xsd:annotation> <xsd:documentation>The address is not on either or both sides of the street or the concept of side of street does not apply to the address. For instance an intersection address would have a Address Side Of Street of none. </xsd:documentation> </xsd:annotation></xsd:enumeration> <xsd:enumeration value="unknown" ></xsd:enumeration> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<AddressSideOfStreet>both</AddressSideOfStreet>
Quality Measures	AddressLeftRightMeasure
Quality Notes	

2.3.6.7 Address Z Level

Element Name	AddressZLevel
Other common names for this element	Floor, building level, story
Definition	Floor or level of the structure
Definition Source	New
Data Type	Integer

Existing Standards for this Element	N/A
Domain of Values for this Element	Positive integers
Source of Values	Field observations, building plans, or other source of spatial data collection.
How Defined (eg, locally, from standard, other)	The lowest level of a building is 1, and ascending numbers are assigned in order to each higher level.
Examples	1 (=lowest floor), 3 (the ground floor, if the structure has two below-ground floors)
Notes/Comments	<ol style="list-style-type: none"> 1. This attribute is intended for use with multi-story buildings, where the Subaddress Element does not indicate the building level on which the subaddress is found. Common examples include hotel lobbies and mezzanines, named meeting rooms in conference centers, and multi-unit residential buildings whose unit identifiers do not indicate the building level ("Penthouse", "Basement"). 2. "Ground level" is often ambiguous (especially when the building itself is built on sloping ground), and floor designations often omit parking and basement levels at the base of the building. To avoid confusion in assigning Address ZLevel values, 1 should be assigned to the lowest level of the building, and ascending numbers assigned in order to each higher level, regardless of how that level is named within the building floor plan. Use the Subaddress Element to record how a subaddress is named in the building floor plan.
XML Tag	<AddressZLevel>
XML Model	<pre> <xsd:simpleType name="AddressZLevel_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> </xsd:restriction> </xsd:simpleType> </pre>
XML Example	<AddressZLevel>13</AddressZLevel>
Quality Measures	Tabular Domain Measure

Quality Notes	
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2.3.6.8 Location Description

Element Name	Location Description
Other common names for this element	Additional Location Information
Definition	A text description providing more detail on how to identify or find the addressed feature.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	No
Source of Values	None
How Defined (eg, locally, from standard, other)	Locally
Example	"White house at intersection.", "400 yards west of water tank."
Notes/Comments	
XML Tag	< LocationDescription >
XML Model	<pre> <xsd:simpleType name="LocationDescription_type"> <xsd:restriction base="xsd:string"></xsd:restriction> </xsd:simpleType> </pre>
XML Example	<LocationDescription>White house at intersection</LocationDescription>
Quality Measures	Location Description Field Check Measure
Quality Notes	

2.3.6.9 Mailable Address

Element Name	MailableAddress
Other common names for this element	
Definition	Identifies whether an address receives USPS mail delivery (that is, the address is occupiable, and the USPS provides provides on-premises USPS mail delivery to it).
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Yes, No, Unknown
Source of Values	New
How Defined (eg, locally, from standard, other)	New definition
Example	<p>1391 North Oak Street (apartment building): Mailable Address = Yes</p> <p>645 Maine Avenue (vacant lot): Mailable Address = No</p> <p>701 Lee Street (business): Mailable Address = Yes</p> <p>703 Lee Street (vacant storefront): Mailable Address = Yes</p> <p>1440 Golden Gate Avenue (recreational field, no structures): Mailable Address = No</p> <p>6813 Homestead Road (residence, in USPS home delivery area): Mailable Address = Yes</p> <p>49984 Aspen Road (residence, outside USPS home delivery area): Mailable Address = No</p>
Notes/Comments	<ol style="list-style-type: none"> 1. The Mailable Address attribute indicates whether USPS mail will or will not be delivered to the address. This attribute is useful in determining where not to send notices or correspondence via USPS mail. 2. Postal Delivery Address Class addresses (e.g., PO Box, RD Route, and General Delivery addresses) all have a Mailable Address value = Yes, except in unusual circumstances such as the temporary closure of a Post Office. 3. There are many addressed, occupied features, including residences, businesses, and other features which have been

	<p>addressed to facilitate the provision of E-911 and non-emergency services, and for other types of premises-based delivery services, but which are not served by premises-based USPS delivery. It is important that these location (situs) addresses not be confused with mailable addresses. The thoroughfare addresses assigned to these features, while appearing to be mailable, would be Mailable Address = No.</p> <p>4. In verifying which addresses are not mailable, it should further be noted that the USPS ZIP+4 address validation service only validates street name and address range to a ZIP Code. Thus a vacant, addressed parcel would potentially validate as mailable if it fell within an address range on a street that was verified within the ZIP Code.</p> <p>5. There are many addressed features where USPS mail cannot be delivered: vacant lots, pumping stations, parking lots, structures under construction or destroyed by disaster, and undeveloped parklands, for example. These addresses would have a Mailable Address = No.</p> <p>6. In addition, many addresses are in areas where the USPS delivers mail to a PO Box, Rural Route Box, or General Delivery address, not to the premises address. These premise addresses also would have a Mailable Address = No.</p> <p>7. The Mailable Address attribute can also be used to identify addresses where mail delivery has been temporarily suspended due to a large-scale natural disaster or other event.</p> <p>8. The Mailable Address attribute is not intended for tracking normal vacancies due tenant turnover or change in ownership. It should be set to "No" only if mail cannot be delivered because of USPS delivery rules or long-term physical conditions at the address.</p>
XML Tag	<pre>< MailableAddress ></pre>
XML Model	<pre><xsd:simpleType name="MailableAddress_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value='.*' /> <xsd:enumeration value="Yes" > <xsd:annotation> <xsd:documentation>The USPS delivers mail to this address.</xsd:documentation> </xsd:annotation></xsd:enumeration> <xsd:enumeration value="No" > <xsd:annotation> <xsd:documentation>The USPS does not deliver mail to this address.</xsd:documentation> </xsd:annotation></xsd:enumeration></pre>

	<pre><xsd:enumeration value="Unknown" > <xsd:annotation> <xsd:documentation>It is unknown whether the USPS delivers mail to this address.</xsd:documentation> </xsd:annotation></xsd:enumeration> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<MailableAddress>Yes</MailableAddress>
Quality Measures	Tabular Domain Measure Related Element Value Measure
Quality Notes	Related Element Value Measure can be helpful if the determination of the Mailable Address attribute is determined by Address Feature Type or other related information.

2.3.7 Element Attributes

2.3.7.1 Address Number Parity

Element Name	AddressNumberParity
Other common names for this element	
Definition	The property of an Address Number with respect to being odd or even.
Definition Source	Adapted from MerriamWebster's Dictionary
Data Type	characterString
Existing Standards for this Element	NA
Domain of Values for this Element	"odd", "even"
Source of Values	NA
How Defined (eg, locally, from standard, other)	Defined in integer mathematics.
Notes/Comments	1. Address Number Parity applies to individual Address Numbers only. Address Range Parity shows the Address

	<p>Number Parity values for the Address Numbers within a range.</p> <ol style="list-style-type: none"> 2. Odd and even addresses are usually associated with opposite sides of a street. For example, a jurisdiction may consistently assign odd numbers to the "left" side of its streets and even numbers to the "right" side. ("Left" and "right" would be defined with reference to the address schema.). 3. A Complete Address Number with an Address Number Suffix has the same parity as the Address Number alone. For example, 610 and 610A are both even; 611 and 611 1/2 are both odd.
XML Tag	AddressNumberParity
XML Model	<pre><xsd:simpleType name="AddressNumberParity_type"> <xsd:restriction base="xsd:token"> <xsd:enumeration value="Even" /> <xsd:enumeration value="Odd" /> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><CompleteAddressNumber AddressNumberParity="even" > <AddressNumber>456</AddressNumber> <AddressNumberSuffix separator=" ">B</AddressNumberSuffix> </CompleteAddressNumber></pre>
Quality Measure	Address Number Parity Measure
Quality Notes	

2.3.7.2 Attached Element

Element Name	AttachedElement
Other common names for this element	
Definition	This attribute identifies when two or more Complete Address Number elements or two or more Complete Street Name elements have been combined without a space separating them.
Definition Source	New
Data Type	characterString
Required Element	No

Existing Standards for this Element	None
Domain of Values for this Element	Attached, Not Attached, Unknown
Source of Values	New
How Defined (eg, locally, from standard, other)	New
Example	121E E Street (Attached) 121 E E Street (Not Attached) Banhoffstrasse (Attached) Banhoff Street (Not Attached)
Notes/Comments	<ol style="list-style-type: none"> 1. The Attached Element attribute can be used to indicate that two or more Complete Address Number elements or two or more Complete Street Name elements have been combined with no space between them, so that the parsing and construction of the elements can be managed correctly. 2. Complete Address Numbers are often written with no space between the Address Number and the Address Number Prefix or Address Number Suffix (e.g., 121E E Street). The Attached Element can be used to indicate where the space is omitted as a standard practice. 3. German-language street names words are often written as a single word, combining the Street Name and Street Name Post Type (e.g., Banhoffstrasse). The Attached Element can be used to indicate such names. Attached Elements are rare in the United States street names, and normally this attribute will not be needed. In such cases the entire single word can be placed in the Street Name field, and the street type field can be left blank. This is typically done with the Street Name Street Name Post Type combination "Broadway".
XML Tag	AttachedElement
XML Model	<pre> <xsd:simpleType name="AttachedElement_type"> <xsd:restriction base="xsd:string"> <xsd:enumeration value="Attached"> <xsd:annotation> <xsd:documentation>The elements inside the Complete Address Number or Complete Street Name are attached and need special parsing rules.</xsd:documentation></pre>

	<pre></xsd:annotation></xsd:enumeration> <xsd:enumeration value="Not Attached"></xsd:enumeration> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><CompleteAddressNumber Address Number Parity="even" AttachedElement="Attached" > <AddressNumber>456</AddressNumber> <AddressNumberSuffix separator=" ">B</AddressNumberSuffix> </CompleteAddressNumber></pre>
Quality Measures	Check Attached Pairs Measure Tabular Domain Measure
Quality Notes	Check Attached Pairs Measure checks for adjacent pairs of attached attributes. The value of the street name as a whole, including the attached components are checked in the Tabular Domain Measure and Pattern Sequence Measure, applied to Complete Street Name.

2.3.7.3 Subaddress Component Order

Element Name	Subaddress Component Order
Other common names for this element	
Definition	The order in which Subaddress Type and Subaddress Identifier appear within an Subaddress Element
Definition Source	New
Data Type	Integer
Existing Standards for this Element	None
Domain of Values for this Element	1 = Subaddress Type first, then Subaddress Identifier (or: Subaddress Element does not include an Subaddress Type). 2 = Subaddress Identifier first, then Subaddress Type. 3 = Not stated.
Source of Values	New
How Defined (eg, locally, from	Within this standard

standard, other	
Example	<ol style="list-style-type: none"> 1. Room 212 (Subaddress Component Order = 1 = "Room" (the type) precedes "212" (the identifier)) 2. Empire Room (Subaddress Component Order = 2 = "Room" (the type) follows "Empire" (the identifier)) 3. Mezzanine (Subaddress Component Order = 1 = "Mezzanine" (the identifier) only; no type is given.) 4. Floor 5 (Subaddress Component Order = 1 = "Floor" (the type) precedes "5" (the identifier)) 5. Fifth Floor (Subaddress Component Order = 2 = "Floor" (the type) follows "Fifth" (the identifier)) 6. Terrace Ballroom (Subaddress Component Order = 2 --this would refer to a ballroom, the "Terrace" ballroom) 7. Ballroom Terrace (Subaddress Component Order = 2 --this would refer to a terrace, the "Ballroom" terrace)
Notes/Comments	<ol style="list-style-type: none"> 1. This attribute tells data users how to construct an Subaddress Element from its component Subaddress Type and Subaddress Identifier. There are three possibilities, described below. The order is usually obvious for any given record, but if there are a large number of records it may not be feasible to examine each record individually. This attribute supports automated procedures for composing Subaddress Elements. 2. Usually a Subaddress Element is composed of a Subaddress Type followed by a Subaddress Identifier (e.g. "Room 212", "Floor 5") 3. However, if the Subaddress Identifier is a name or an ordinal number, it typically precedes the Subaddress Type (e.g. "Empire Room", "Fifth Floor") 4. Occasionally a Subaddress Element includes only a Subaddress Identifier (e.g. "Mezzanine", "Penthouse", "Rear"). These cases are grouped under Type 1. 5. Usually the component order is obvious upon examination, but ambiguous cases occur, such as "Terrace Ballroom" and "Ballroom Terrace" above. In these cases the order can be determined only by field examination or reference to authoritative records.
XML Tag	SubaddressComponentOrder
XML Model	<pre> <xsd:simpleType name="SubaddressComponentOrder_type"> <xsd:restriction base="xsd:integer"> <xsd:enumeration value="1"> <xsd:annotation> <xsd:documentation>SubaddressType first, then </pre>

	<p>Subaddress Identifier (or: Subaddress Element does not include an Subaddress Type).</p> <p>Example: "Floor 7" </xsd:documentation></xsd:annotation></xsd:enumeration><xsd:enumeration value="2"><xsd:annotation><xsd:documentation>SubaddressIdentifier first, then Subaddress Type.</p> <p>Example: "Empire Room" </xsd:documentation></xsd:annotation></xsd:enumeration><xsd:enumeration value="3"><xsd:annotation><xsd:documentation>Order is not known or unstated.</xsd:documentation></xsd:annotation></xsd:enumeration></xsd:restriction></xsd:simpleType></p>
XML Example	<CompleteSubaddress> <SubaddressElement Element Sequence Number="1" "SubaddressComponentOrder="1" > <SubaddressType>Building</SubaddressType> <SubaddressIdentifier>A</SubaddressIdentifier> </SubaddressElement> <SubaddressElement Element Sequence Number="1" "SubaddressComponentOrder="2" > <SubaddressType>Room</SubaddressType> <SubaddressIdentifier>Empire </SubaddressIdentifier> </SubaddressElement> </CompleteSubaddress>
Quality Measures	Tabular Domain Measure Subaddress Component Order Measure
Quality Notes	

2.3.7.4 Element Sequence Number

Element Name	Element Sequence Number
Other common names for this element	
Definition	The order in which the Subaddress Elements should be written within a Complete Subaddress; the order in which the Landmark Names should be written within a Complete Landmark Name; or the order in which the Place Names should be written within

	a Complete Place Name.
Definition Source	New
Data Type	Integer
Existing Standards for this Element	None
Domain of Values for this Element	Positive integers
Source of Values	Locally determined
How Defined (eg, locally, from standard, other)	Locally
Example	For the Complete Place Name "Sun Valley, San Rafael, Marin County," the Place Name elements would have the following Element Sequence Numbers: Sun Valley: Element Sequence Number= 1 San Rafael: Element Sequence Number= 2 Marin County: Element Sequence Number= 3
Notes/Comments	1. Complete Subaddresses, Complete Landmark Names, or Complete Place Names can include more than one element. When that occurs, the Element Sequence Number shows the order in which the components should be assembled. 2. If the Element Sequence Number is omitted, the sequence is presumed to be unknown or irrelevant.
XML Tag	ElementSequenceNumber
XML Model	<pre><xsd:simpleType name="ElementSequenceNumber_type"> <xsd:restriction base="xsd:integer" /> </xsd:simpleType></pre>
XML Example	<pre><CompleteLandmark Separator="," > <LandmarkName ElementSequenceNumber="1" >CAMP CURRY</LandmarkName> <LandmarkName ElementSequenceNumber="2" >YOSEMITE NATIONAL PARK</LandmarkName> </CompleteLandmark></pre>
Quality Measures	Element Sequence Number Measure Related Element Uniqueness Measure

	Uniqueness Measure
Quality Notes	

2.3.7.5 Place Name Type

Element Name	PlaceNameType
Other common names for this element	Type of Place Name
Definition	The type of Place Name used in an Address
Definition Source	<p>The element definition is new. The definitions of the specific examples given below (community, municipal, etc.) are new and partly adapted from:</p> <ol style="list-style-type: none"> 1. FGDC's "Framework Data Content Standard Part 5: Governmental unit and other geographic area boundaries"; and, 2. USPS Publication 28, Section 292, "Urbanization."
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Community, Municipal, USPS, County, Region, Unknown. Additional values may be created as needed.
Source of Values	Locally determined
How Defined (eg, locally, from standard, other)	<p>Community: The name of an area, sector, or development, such as a neighborhood or subdivision in a city, or a rural settlement in an unincorporated area, that is not an incorporated general-purpose local government or county. The name may arise from official recognition or from popular usage.</p> <p>Municipal: The name of the general-purpose local government (if any) where the address is physically located.</p> <p>USPS: The name assigned to the post office from which the USPS delivers mail to the address.</p> <p>County: the county or county equivalent where the address is physically located.</p> <p>Region: The name of the region where the address is physically located. Typically this is the name of the central city within the</p>

	<p>region. If precisely-defined names are needed, Census terms and definitions may be applied, but popular usage is often imprecise and to some extent subjective.</p> <p>Unknown: The Place Name Type is not known.</p>
Example	<p>A part of the Regent Square neighborhood is within Swissvale Borough, just outside the city limits of Pittsburgh, PA. It is served by the Wilkinsburg post office. The following place names might be used for this part of the neighborhood:</p> <p>Community: Regent Square</p> <p>Municipal: Swissvale</p> <p>USPS: Wilkinsburg</p> <p>MSAG: Swissvale</p> <p>County: Allegheny</p> <p>Region: Pittsburgh</p>
Notes/Comments	Place Name Type is an attribute of the Place Name element. It is used to show what kind of place name is given for the address.
XML Tag	PlaceNameType
XML Model	<pre><xsd:simpleType name="PlaceNameType_type"> <xsd:restriction base="xsd:string"> <xsd:enumeration value="Community" > <xsd:annotation> <xsd:documentation xml:lang="en"> The name of an area, sector, or development, such as a neighborhood or subdivision in a city, or a rural settlement in an unincorporated area, that is not an incorporated general-purpose local government or county. The name may arise from official recognition or from popular usage. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="USPS" > <xsd:annotation> <xsd:documentation xml:lang="en"> The name assigned to the post office from which the USPS delivers mail to the address. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="Municipal" > <xsd:annotation> <xsd:documentation xml:lang="en"> The name of the general-purpose local government</pre>

	<pre>(if any) where the address is physically located. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="County" > <xsd:annotation> <xsd:documentation xml:lang="en"> the county or county equivalent where the address is physically located. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="Region" > <xsd:annotation> <xsd:documentation xml:lang="en"> The name of the region where the address is physically located. Typically this is name of the central city within the region. For precise, systematic terms, Census terms and definitions may be applied, but popular usage is often imprecise and to some extent subjective. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:enumeration value="Unknown" > <xsd:annotation> <xsd:documentation xml:lang="en"> The PlaceNameType is not known. </xsd:documentation> </xsd:annotation> </xsd:enumeration> <xsd:pattern value=".+"></xsd:pattern> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<pre><PlaceName PlaceNameType="County"> Shelby</PlaceName> <PlaceName PlaceNameType="USPS"> Washington</PlaceName> <PlaceName PlaceNameType="Community"> Urbanizacion Los Olmos</PlaceName></pre>
Quality Measures	Tabular Domain Measure
Quality Measures	Place Name Type classifications are locally determined. Validation routines should be written to test against local rules.

	Tabular Domain Measure can test for consistent use of the Place Name Type values for a given area.
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2.3.7.6 GNISFeature ID

Element Name	GNISFeature ID
Other common names for this element	(Obsolete) FIPS Codes for populated places (FIPS 5-5), counties (FIPS 6-4), and states (FIPS 5-2) (all subsumed and superseded by GNISFeature ID)
Definition	"A permanent, unique number assigned to a geographic feature for the sole purpose of uniquely identifying that feature as a record in any information system database, dataset, file, or document and for distinguishing it from all other feature records so identified. The number is assigned sequentially (highest existing number plus one) to new records as they are created in the Geographic Names Information System."
Definition Source	Geographic Names Project, USGS, 523 National Center, Reston, VA 20192-0523, as posted August 25, 2009 at: http://geonames.usgs.gov/domestic/metadata.htm "Feature Identifier"
Data Type	Integer
Existing Standards for this Element	U.S. Geological Survey, 19810501, U.S. Geographic Names Information System (GNIS): U.S. Geological Survey, Reston, VA.
Domain of Values for this Element	Integers from 1 to 9,999,999,999 inclusive.
Source of Values	U.S. Geological Survey, 19810501, U.S. Geographic Names Information System (GNIS): U.S. Geological Survey, Reston, VA. Accessible at: http://geonames.usgs.gov/domestic/index.html
How Defined (eg, locally, from standard, other)	Assigned within U.S. Geographic Names Information System (GNIS)
Example	531676 - United States Department of the Interior Building, Washington DC 1658360 - Curry Village, Yosemite National Park, CA (Old FIPS55 Place Code: 17638) 1248001 - Florence County, SC (Old FIPS55 Place Code: 99041)

Notes/Comments	1. "The Geographic Names Information System (GNIS) is the Federal and national standard for geographic nomenclature. The U.S. Geological Survey developed the GNIS in support of the U.S. Board on Geographic Names as the official repository of domestic geographic names data, the official vehicle for geographic names used by all departments of the Federal Government, and the source for applying geographic names to Federal electronic and printed products. "The GNIS contains information about physical and cultural geographic features of all types in the United States, associated areas, and Antarctica, current and historical, but not including roads and highways. The database holds the Federally recognized name of each feature and defines the feature location by state, county, USGS topographic map, and geographic coordinates. Other attributes include names or spellings other than the official name, feature designations, feature classification, historical and descriptive information, and for some categories the geometric boundaries. "... The GNIS collects data from a broad program of partnerships with Federal, State, and local government agencies and other authorized contributors, and provides data to all levels of government, to the public, and to numerous applications through a web query site, web map and feature services, file download services, and customized files upon request." (Quoted August 25, 2009 from http://geonames.usgs.gov/domestic/index.html) 2. "The [GNIS Feature Identifier] number, by design, carries no information or association to the content of the feature record and therefore is not subject to change as attribute values change. Once assigned to a feature, the number is never changed or withdrawn, and never reassigned. The Feature ID can be applied in conjunction with system-unique record identifiers in any database or system, thus providing a national standard common reference identifier across multiple datasets. The Feature ID is stored in the GNIS database as an integer with a maximum of ten digits. (Source: Geographic Names Project, USGS, 523 National Center, Reston, VA 20192-0523.)" (Quoted August 25, 2009 from: http://geonames.usgs.gov/domestic/metadata.htm "Feature Identifier") 3. The Board of Geographic Names has set forth its principles, policies, and procedures for recognizing and standardizing domestic geographic names in its "Principles, Policies, and Procedures," posted at: http://geonames.usgs.gov/domestic/policies.htm 4. In the context of the address standard, GNISFeature ID is
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	<p>applicable primarily to Landmark Names, Place Names and State Names. GNIS also includes the names of natural features, which are generally outside the scope of the address standard.</p> <p>5. The Board of Geographic Names seeks to include in GNIS all feature names of public interest. Local authorities are encouraged to submit local feature names that are not already included in GNIS.</p> <p>6. GNIS offers useful guidance to address authorities in selecting one name as a standard where several variants exist. GNISFeature ID's, if assigned to Landmark Names or Place Names, can help reconcile minor name variations that can frustrate computer matches (e.g., DeKalb, Dekalb, De Kalb). GNISFeature ID's also provide a way to link a preferred local variant name to a nationally-recognized standard.</p> <p>7. GNIS provides a primary location point (x, y coordinate) for each feature. The GNIS primary point will in many cases differ from address coordinates assigned to the same feature by the addressing authority, due to differences in procedure and precision. GNIS procedures are described at: http://geonames.usgs.gov/domestic/metadata.htm "Primary Point".</p>
XML Tag	< GNISFeatureID >
XML Model	<xsd:simpleType name="GNISFeatureID_type"> <xsd:restriction base="xsd:integer" /> </xsd:simpleType>
XML Example	<CompleteLandmark Separator=" , "> <LandmarkName ElementSequenceNumber=" 0 " GNISFeatureID="1658360" >CURRY VILLAGE</LandmarkName> <LandmarkName Element Sequence Number=" 1 ">YOSEMITE NATIONAL PARK</LandmarkName> </CompleteLandmark>
Quality Measures	Spatial Domain Measure Tabular Domain Measure
Quality Notes	

2.3.7.7 ANSI State County Code

Element Name	ANSIState County Code

Other common names for this element	(Obsolete) FIPS State Codes (FIPS Publication 5-2), FIPS County Codes (FIPS Publication 6-4)
Definition	A set of two-digit numeric codes identifying the states, the District of Columbia, Puerto Rico, and the insular areas of the United States, which may be followed by a three-digit numeric code identifying a county or equivalent entity therein.
Definition Source	State codes: ANSI INCITS 38:200x. County codes: ANSI INCITS 31:200x.
Data Type	Integer
Existing Standards for this Element	State codes: ANSI INCITS 38:200x. County codes: ANSI INCITS 31:200x.
Domain of Values for this Element	State codes: 01 through 99 (not all codes are in use). County codes: 001 through 999 (not all codes are in use).
Source of Values	State codes: ANSI INCITS 38:200x. County codes: ANSI INCITS 31:200x.
How Defined (eg, locally, from standard, other)	State codes: ANSI INCITS 38:200x. County codes: ANSI INCITS 31:200x.
Examples	48 (Texas) 48301 (Loving County, Texas: 48 = Texas; 301 = Loving County) 15005 (Kalawao County, Hawaii: 15 = Hawaii; 005 = Kalawao County) 51610 (Falls Church, Virginia: 51 = Virginia; 610 = Falls Church city (an independent city with county-level governance status))
Notes/Comments	<ol style="list-style-type: none"> ANSI state and county codes provide numeric identifiers for states and state equivalents (see State Name) and their counties or county equivalents (see Place Name - Other common names for this element (county)). State codes are two-digit numbers. County codes are three-digit numbers that typically begin with 001 for each state and state equivalent. A county identifier is a five digit combination of the state code followed by the county code. The state and county codes were originally established and maintained by the National Institute of Standards and Technology (NIST) as Federal Information Processing Standards (FIPS) Publications 5-2 (for state codes) and 6-4 (for

	county codes). The standards were withdrawn by NIST on September 2, 2008 and replaced by the ANSI INCITS 38:200x standard and ANSI INCITS 31:200x standard respectively, with the Census Bureau as the maintenance authority for both.
XML Tag	<ANSIStateCountyCode>
XML Model	<xsd:simpleType name="ANSIStateCountyCode_type"><xsd:restriction base="xsd:string" /></xsd:simpleType>
XML Example	<ANSIStateCountyCode> 01015</ANSIStateCountyCode>
Quality Measures	Tabular Domain Measure Spatial Domain Measure
Quality Notes	

2.3.7.8 Delivery Address Type

Element Name	DeliveryAddressType
Other common names for this element	
Definition	Whether the Delivery Address includes or excludes the Complete Subaddress.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Subaddress Included - The Delivery Address includes the Complete Subaddress (if any) Subaddress Excluded - The Delivery Address excludes the Complete Subaddress (if any) Unstated - Not stated/no information (default value)
Source of Values	New
How Defined (eg, locally, from	Defined herein.

standard, other)	
Example	<p>Delivery Address = 123 Main Street, Apt. 1 (Delivery Address Type = Subaddress Included)</p> <p>Delivery Address = 123 Main Street Complete Subaddress = Apt. 1 (Delivery Address Type = Subaddress Excluded)</p> <p>Delivery Address = Ames High School, Room 12 (Delivery Address Type = Subaddress Included)</p> <p>Delivery Address = Ames High School Complete Subaddress = Room 12 (Delivery Address Type = Subaddress Excluded)</p>
Notes/Comments	<ol style="list-style-type: none"> 1. The Delivery Address typically excludes the Complete Subaddress. However, there are sometimes reasons to omit or separate the Complete Subaddress from the Delivery Address. For example, the Complete Subaddress can hamper address geocoding, and contact lists often separate the Complete Subaddress from the rest of the feature address (see, for example, the EPA Contact Information Data Standard). 2. The Delivery Address Type shows whether the Delivery Address includes or excludes the Complete Subaddress. 3. If all the records in a file have the same Delivery Address Type, this information can be included in the file-level metadata. If records of different types are likely to be mixed together, the Delivery Address Type should be included in each record.
XML Tag	<pre>< DeliveryAddressType ></pre>
XML Model	<pre><xsd:simpleType name="DeliveryAddressType_type"> <xsd:restriction base="xsd:token"> <xsd:enumeration value='SubAddress Included'> <xsd:annotation> <xsd:documentation>The Delivery Address includes the Complete Subaddress (if any) </xsd:documentation></xsd:annotation> </xsd:enumeration> <xsd:enumeration value='SubAddress Excluded'> <xsd:annotation> <xsd:documentation>The Delivery Address includes the Complete Subaddress (if any) </xsd:documentation></xsd:annotation> </xsd:enumeration> <xsd:enumeration value='Unstated'> <xsd:annotation> <xsd:documentation>Not stated/no information (default value) </xsd:documentation> </xsd:annotation></xsd:enumeration></pre>

	</xsd:restriction> </xsd:simpleType>
XML Example	<DeliveryAddress DeliveryAddressType="Subaddress Included" >123 Dartmouth College Highway, Suite 100</DeliveryAddress> <hr/> <DeliveryAddress DeliveryAddressType="Subaddress Excluded" >123 Dartmouth College Highway, Suite 100</DeliveryAddress>
Quality Measures	Tabular Domain Measure Delivery Address Type Subaddress Measure
Quality Notes	

2.3.8 Address Lineage Attributes

2.3.8.1 Address Start Date

Element Name	Address Start Date
Other common names for this element	
Definition	The earliest date on which the address is known to exist.
Definition Source	New
Data Type	Date
Existing Standards for this Element	For representation of dates: YYYYMMDD (Year-month-date)(ISO 8601:2004 and FGDC CSDGM:1998).
Domain of Values for this Element	May be created locally
Source of Values	Local records
How Defined (eg, locally, from standard, other)	Locally
Example	20050415
Notes/Comments	1, The Address Start Date is record-level metadata that should be stored for each address.

	<ol style="list-style-type: none"> 2. Changes to the Complete Address Number values or to the Complete Street Name values warrant retirement and a "new" address. 3. Changes to the values contained in Complete Subaddress, Place Name, and Zip Code do not necessarily warrant a "new" address. 4. Therefore, the Complete Address Number and the Complete Street Name, and the Place Name, and Zip Code elements should each have their own start dates and end dates, separate from the address start/end dates, and the dataset start/end dates. The simple elements that make up the Complete Address Number and Complete Street Name do not need to have individual start/end dates. 5. An address start date is not assigned until the Address Lifecycle Status is "proposed" or "active". The start date is generally the date on which the address authority assigns or reserves the address for use. As a rule this should be done as early as possible in the development process, generally upon subdivision or issuance of the intial building permit. 6. By definition, an address with a Address Lifecycle Status of "potential" has no Address Start Date. 7. Dates are stored in many different ways by various software programs, typically as an integer showing the number of days since some arbitrary beginning date, and converted upon display to a format that people can read. This standard does not prescribe how software should create or handle dates internally. However, for display and exchange of dates, this standard prescribes the YYYYMMDD format specified in ISO 8601:2004 and in the FGDC Content Standard for Digital Geospatial Metadata (v2, 1998). The standard is unambiguous and easily-understood, it is recognized nationally and internationally, and it can be extended if needed to include hours, minutes and seconds.
XML Tag	< AddressStartDate >
XML Model	<xsd:simpleType name="AddressStartdDate_type"> <xsd:restriction base="xsd:date" /> </xsd:simpleType>
XML Example	<AddressStartDate>19950517</AddressStartDate>
Quality Measures	Start End Date Order Measure Future Date Measure

Quality Notes	
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2.3.8.2 Address End Date

Element Name	Address End Date
Other common names for this element	
Definition	The date on which the address is known to no longer be valid.
Definition Source	New
Data Type	Date
Existing Standards for this Element	For representation of dates: YYYYMMDD (Year-month-date)(ISO 8601:2004 and FGDC CSDGM:1998).
Domain of Values for this Element	May be created locally
Source of Values	Local records
How Defined (eg, locally, from standard, other)	Locally
Example	20080726
Notes/Comments	<ol style="list-style-type: none">1. The Address End Date is record-level metadata that should be stored for each address.2. Changes to the Complete Address Number value or to the Complete Street Name value warrant retirement and a "new" address.3. Changes to the values contained in Complete Subaddress, Place Name, and Zip Code do not necessarily warrant a "new" address.4. Therefore, the Complete Address Number and the Complete Street Name, and the Place Name, and Zip Code elements should have start dates and end dates for the element itself, separate from the dataset start/end dates. The simple elements that make up the Complete Address Number and Complete Street Name do not need to have individual start/end dates.5. An address is given an end date when the Address Authority retires it.6. If the Address Lifecycle Status is potential, proposed or active, then the Address End Date must be null. If the Address

	<p>Lifecycle Status is retired, then the address or name must have an Address End Date.</p> <p>7. Dates are stored in many different ways by various software programs, typically as an integer showing the number of days since some arbitrary beginning date, and converted upon display to a format that people can read. This standard does not prescribe how software should create or handle dates internally. However, for display and exchange of dates, this standard prescribes the YYYYMMDD format specified in ISO 8601:2004 and in the FGDC Content Standard for Digital Geospatial Metadata (v2, 1998). The standard format is unambiguous and easily understood, it is recognized nationally and internationally, and it can be extended if needed to include hours, minutes, and seconds.</p>
XML Tag	<AddressEndDate>
XML Model	<xsd:simpleType name="AddressEndDate_type"><xsd:restriction base="xsd:date" /></xsd:simpleType>
XML Example	<AddressEndDate>19950517</AddressEndDate>
Quality Measures	Start End Date Order Measure Future Date Measure
Quality Notes	

2.3.8.3 Data Set ID

Element Name	DataSetID
Other common names for this element	
Definition	An identifier in each record of a transmitted dataset, assigned by the sender or the receiver of the dataset, to link each record of the dataset to the file-level metadata that accompanies the dataset.
Definition Source	New
Data Type	characterString
Existing Standards	None

for this Element	
Domain of Values for this Element	Yes
Source of Values	Assigned by the sender or the receiver of a data set.
How Defined (eg, locally, from standard, other)	Assigned by the sender or the receiver of a data set.
Example	Dataset ID 1475
Notes/Comments	<ol style="list-style-type: none"> 1. The content of the file-level metadata is specified in the FGDC's Content Standard for Digital Geospatial Metadata. 2. The ID may be assigned by the sender upon transmittal of the dataset or the recipient upon receipt. 3. Normally the identifier will be numeric, but the standard does not preclude alphanumeric identifiers.
XML Tag	<pre><DataSetID></pre>
XML Model	<pre><xsd:simpleType name="DataSetID_type"> <xsd:restriction base="xsd:string"> <xsd:pattern value=".+"></xsd:pattern> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<DataSetID>1457</DataSetID>
Quality Measures	Related Not Null Measure
Quality Notes	

2.3.8.4 Address Direct Source

Element Name	AddressDirectSource
Other common names for this element	
Definition	Source from which the data provider obtained the address, or with which the data provider validated the address.

Definition Source	New
Data Type	Text
Existing Standards for this Element	None
Domain of Values for this Element	No
Source of Values	NA
How Defined (eg, locally, from standard, other)	By data provider
Examples	Regional or state address repository owner; official Address Authority; phone company; assessor; commercial data provider
Notes/Comments	<p>1. The Address Direct Source may or may not be the same as the Address Authority. For example, a regional GIS agency might obtain official address records from the cities and counties that are Address Authorities in the region. It might then provide the consolidated set of records to a state agency, which might in turn provide a state-wide file to a federal agency.</p> <ul style="list-style-type: none"> --When the regional agency receives address records from the city and county Address Authorities, the Address Authorities are also the Address Direct Sources. --When the regional agency provides records to the state agency, the regional agency is the Address Direct Source. (The Address Authority remains unchanged.) --When the state agency provides address records to the federal agency, the state agency is the Address Direct Source. (The Address Authority remains unchanged.) <p>2. The data provider should enter the Address Direct Source upon creation or transmittal of the address records. Individual address records need contain only the agency name. The file-level metadata should include complete contact information for the Address Direct Source.</p>
Quality Measures	Related Element Value Measure Spatial Domain Measure Tabular Domain Measure
Quality Notes	Related Element Value Measure can check for sources that are associated with a given Address Feature Type or other indicator.

2.4 Address Reference Systems

2.4.1 Address Reference Systems Introduction

An Address Reference System establishes the framework of rules, both spatial and non-spatial, adopted by an Address Authority for assigning addresses within the area it administers. The rules, in turn, provide the basis for address data quality tests that detect address anomalies and errors.

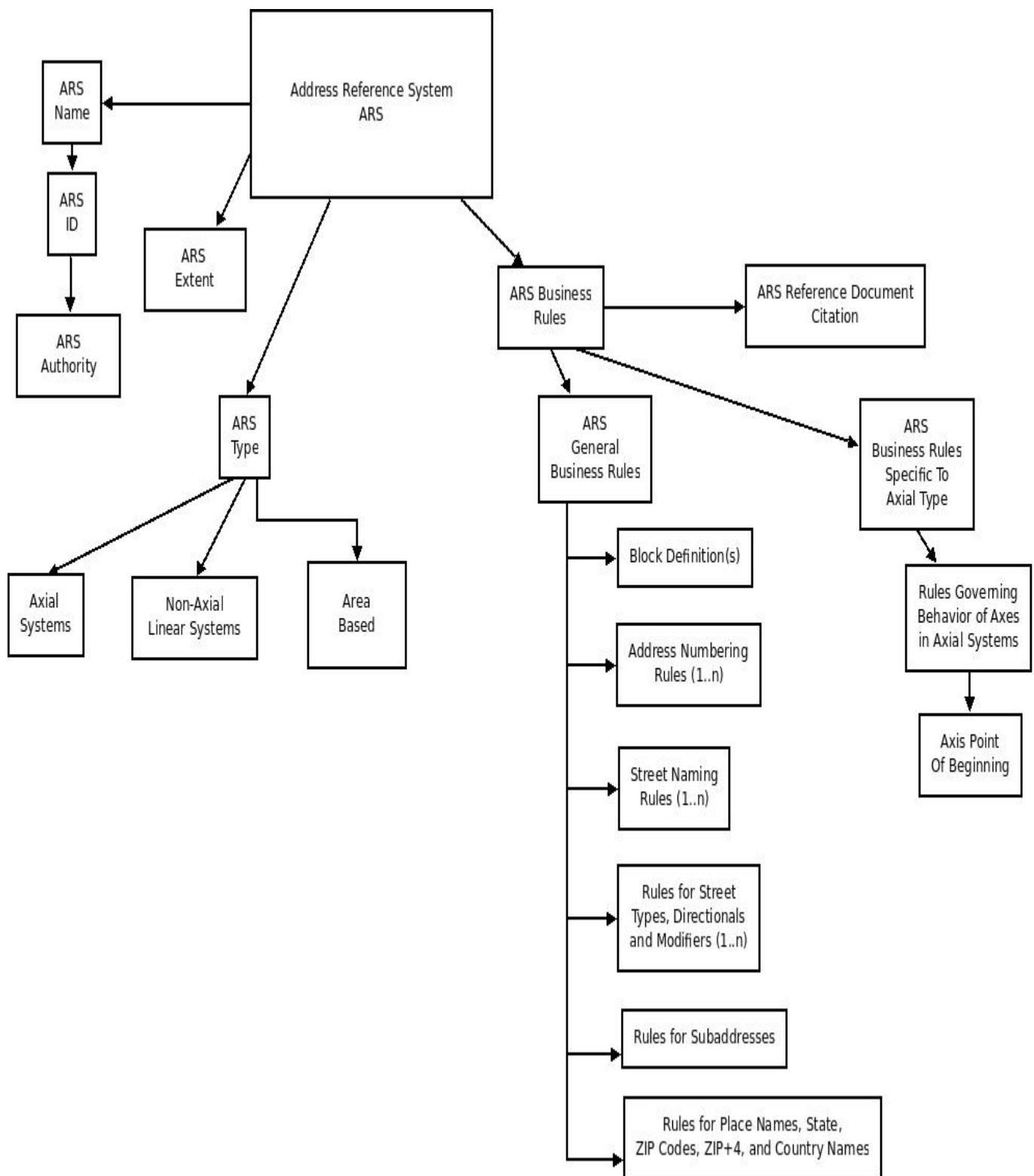
The Address Reference System includes, as needed, rules governing address numbering, street naming, block definition, subaddresses (suites, offices, apartments, etc.), and place names. The Address Reference System may also define address baselines, polylines, and breaklines to guide address numbering throughout the area. Finally, for identification and reference, an Address Reference System includes a name and identifier, the name of the Address Reference System Authority that administers it, the boundary of the area it administers, and reference to the official documents and maps where the rules are codified.

2.4.1.1 Working With Address Reference Systems

Address Reference Systems provide a framework for address assignment and for quality assurance of addresses. In order to use these within a Geographic Information System, the components of a system must be structured into a layer that includes the extent of the system (Address Reference System Extent), and the reference grids, lines or points that govern address numbering throughout the area. In many cases, such grids have been constructed as graphic features that are not structured in a way to make them useful for developing Address Reference System Axis lines, Address Reference System Axis Point Of Beginning locations, Address Reference System Reference Polylines, Address Reference System Range Breakpoints, Address Reference System Range Breaklines and for use in evaluating whether a specific address point falls in the correct place relative to the Address Reference System Rules. Thus it is important that the Address Reference System be created as intelligent geometry providing the tools needed to evaluate any address point found within the Address Reference System. It should also, where appropriate, utilize existing centerlines or other existing features so that exact matching is possible.

2.4.1.2 Types of Address Reference Systems

Address Reference Systems differ in detail from locality to locality, but in the United States all Address Reference Systems fit into one of three broad categories: axial, linear non-axial, and area-based. The categories differ fundamentally in whether and how the street system governs address numbering, and secondarily in the elements needed to compose them. Figure 1 diagrams the types and elements. Table 1 lists for each Address Reference System type, the elements required and permitted to compose it.



2.4.1.3 Axial Type Address Reference Systems

In axial Address Reference Systems, address numbering is organized around axes. The axes may be thoroughfares, rail lines, rivers, or imaginary lines (such as section lines in

PLSS areas, lines of latitude and/or longitude, or arbitrarily drawn lines). Address axes typically extend from a common point of origin (the local "zero" point for address numbers), and all numbers increase with distance from the point of origin.

The axes, in turn, define the zero point for numbering along streets that cross the axes. Most commonly, axial systems organize the streets and address numbering into a grid. In a simple case, if Main Street ran north-south from the town square, and State Street ran east-west, then:

1. Address numbering for Main Street and State Street would increase as one proceeded away from the town square.
2. Address numbering for other north-south streets would begin where they cross State Street and increase in parallel with Main Street.
3. Address numbering for other east-west streets would begin where they cross Main Street and increase in parallel with State Street.

Often the geometric grid is interrupted or deformed by terrain, rivers, highways, rail lines, parks, or other major features. Occasionally there are more than four axes, or numbering does not begin at the same point for all axes.

2.4.1.4 Linear Non-Axial Address Reference Systems

In a linear non-axial Address Reference System, each thoroughfare is addressed independently of the other thoroughfares. There are no axes and there is no grid. Each thoroughfare has its own point of beginning for address numbering, and numbers proceed according to an Address Reference System Numbering Rule from that point to the end of the thoroughfare or the boundary of the Address Reference System. Linear non-axial address reference systems are typically found in areas where the road network is sparse and intersections are few.

2.4.1.5 Area-Based Systems

In area-based Address Reference Systems, Complete Address Numbers are not assigned along a thoroughfare, but within an area. Inside the area, Complete Address Numbers might be assigned according to a spatial pattern (around the block, for example), or by parcel or lot numbers, or chronologically as the buildings are built.

Area-based Address Reference Systems are rare in the United States, but they may be found in gated communities, housing projects, Puerto Rican urbanizations, trailer courts, small tribal settlements, military bases, small islands, campgrounds, and similar developments.

Table 1: Required, Optional, and Inapplicable Elements for Each Type of Address Reference System

Element name	Axial	Linear Non-axial	Area Non-axial
Address Reference System Id	R	R	R
Address Reference System Name	R	R	R
Address Reference System Authority	R	R	R
Address Reference System Extent	R	R	R
Address Reference System Type	R	R	R
Address Reference System Reference Document Citation	R	R	R
Address Reference System Rules	O	O	O
Address Reference System Numbering Rules	O	O	O
Address Reference System Block Rules	O	O	O
Address Reference System Street Naming Rules	O	O	O
Address Reference System Street Type Directional And Modifier Rules	O	O	O
Address Reference System Place Name State Country And Zip Code Rules	O	O	O
Address Reference System Subaddress Rules	O	O	O
Address Reference System Axis	R	NA	NA
Address Reference System Axis Point Of Beginning	R	NA	NA
Address Reference System Reference Polyline	O	NA	NA
Address Reference System Range Breakpoint	O	NA	NA
Address Reference System Range Breakline	O	NA	NA
Address Reference System Range Polygon	O	NA	NA

Note: R - Required; O = Optional; NA = Not Applicable

2.4.2 Elements of an Address Reference System

2.4.2.1 Address Reference System Identification, Extent, and Authority

The general elements identify an Address Reference System and establish the source and extent of its authority. These elements are required for every Address Reference System.

The general elements are: Address Reference System Id, Address Reference System Name, Address Reference System Authority, and Address Reference System Extent.

- The Address Reference System Id provides a unique identifier (typically an integer) for each Address Reference System administered by an Address Reference System Authority. This, plus the Address Reference System Authority, should be unique throughout the United States. Any Address Reference System Authority may administer multiple Address Reference Systems. For example, a county may have more than one Address Reference System for unincorporated areas based on terrain changes, historical addressing patterns, or for other reasons. Cities may annex areas that have previously been addressed, and maintain the old Address Reference System. Other Address Reference Systems may be established in the future as an area develops.
- The Address Reference System Name identifies the Address Reference System in a way that is meaningful to users.
- The Address Reference System Authority element identifies the agency and/or jurisdiction with administrative responsibility for the Address Reference System.
- The Address Reference System Extent defines the geographic boundaries of the area within which addressing is governed by the Address Reference System. The Address Reference System Extent may or may not follow jurisdictional boundaries. There may also be areas within an Address Reference System that are excluded from that Address Reference System because they are addressed according to different rules.
- The Address Reference System Reference Document Citation states where to find the authoritative documents that officially establish the Address Reference System. The documents may include a map of the reference system showing the extent, address numbering system, axes, and other features; a statement of the addressing rules described below; an addressing procedures manual and forms; and an address ordinance.

2.4.2.2 Address Reference System Rules

The remaining elements describe the types of rules that might be adopted by an Address Reference System Authority to govern addressing processes. Due to the variety of local conditions and preferences, not all elements will be applicable to any given system, and all of these presented are optional elements. The rules are collected into the Address Reference System Rules, which incorporates the:

- Address Reference System Numbering Rules,
- Address Reference System Block Rules,
- Address Reference System Street Naming Rules,
- Address Reference System Street Type Directional And Modifier Rules,
- Address Reference System Place Name State Country And Zip Code Rules,
- Address Reference System Subaddress Rules.

2.4.2.3 Address Numbering Rules

Address numbering rules specify how numbers are assigned along thoroughfares, including what features are numbered. They govern when numbers increase, assign even and odd numbers to sides of streets, and specify the beginning points for numbering. They may also specify if and how address ranges relate to blocks.

- What Features are Given Address Numbers?

In addition to permanent primary structures, other features that can be numbered include vacant lots, secondary structures such as detached garages or farm outbuildings, temporary and seasonal structures, additional entrances of large buildings, non-structured uses such as open parking lots, infrastructure features such as cell towers, pump and metering stations, substations and transformers.

- Increase and Interval Rules for Address Numbering

In the United States, address numbers increase according to one of three rules:

1. Distance rule - numbers are assigned according to distance along the thoroughfare (e.g., 1000 numbers per mile, 500 on either side, or 2 per 10.56 feet).
2. "Hundred block" Rule - where streets are laid out in a regular city grid, each block may be given a range of 100 numbers (50 per side), e.g. the 1400 block of Cherry Street. Within each block, numbers may be allocated by distance, or proportionally to the length of the block. If blocks have a fixed length (e.g ten per mile), then this rule can work just like a distance rule.
3. Sequentially - properties or buildings are numbered sequentially, regardless of distance or blocks. The numbers may increase by twos, or they may increase by a larger interval (4, 6, 8, 14, etc.) to leave intermediate numbers for future divisions of land.

- Parity Rules

Parity rules assign even numbers to one side of the thoroughfare and odd numbers to the other side.

- Point(s) of Beginning for Numbering

In axial address reference systems, numbering begins where a thoroughfare intersects (or would intersect) its axis. In non-axial systems, the point of beginning is defined separately for each thoroughfare. Many non-axial systems follow the federal and state highway milepost practice of starting numbering at the southern or western end of the thoroughfare (or boundary of a jurisdiction), and increasing numbers to the north or east.

- Block Rules and Address Range Rules

These rules derive from the increase and interval rules described above. The Address Reference System Block Rules define how the system is organized into blocks for addressing purposes, and whether blocks break at intersections and begin with a new series of numbers, or whether numbering is sequentially ordered along a street without regard to intersecting streets. Such rules also define what constitutes a block break, as many systems do not recognize alleys, or three-way (T) intersections as block breaks.

Address ranges are created using the low and high numbers for each block or other unit defined by the system. Rules pertaining to address ranges are contained with the Address Reference System Block Rules.

2.4.2.4 Street Naming Rules

Street naming rules define what Street Names may be allowed or prohibited, rules to prevent duplicate names, any language considerations, and whether Street Names must follow particular themes or orders (such as themes for names in subdivisions, or alphabetical or numerical orders).

2.4.2.5 Street Name Type, Directional, and Modifier Rules

The Address Reference System Street Type Directional And Modifier Rules govern the use of street types, directionals and quadrants, and modifiers in Complete Street Names. Street type rules might specify a limited list of approved types (such as the list in USPS Publication 28 Appendix C.2), whether the type must precede or follow the street name, and whether specific types are reserved for thoroughfares with specific functional characteristics. Directional rules include whether a quadrant or cardinal direction (or rarely both) is required, optional, or prohibited in an address, and, if so, whether it must precede or follow the street name and type. Modifier rules may allow or prohibit Street Name Pre Modifiers or Street Name Post Modifiers, or specify which modifiers are permitted.

2.4.2.6 Subaddress Rules

These rules, if included, cover the naming and recording of any subaddresses within structures, such as apartments, office suites, campuses, mobile home parks, industrial plants, malls and retail centers with multiple tenants, etc.

2.4.2.7 Place Name, State, Country and ZIP Code Rules

These rules define the specific allowable combinations of a Place Name, State, and ZIP code in the Address Reference System, and provide input to checking these elements for quality. Unlike other elements of the address, which must be defined locally, State Name abbreviations and Zip Codes are defined by the USPS, and Country Names are defined by international standard (ISO 3166-1).

2.4.2.8 Address Axis Rules

An Address Reference System Axis defines the points of beginning for address numbers for the streets that intersect it. The Address Reference System Axis pairs are often the "dividers" for quadrants, or directional designations. Finally, an Address Reference System Axis may also function as "rulers" to define block breaks and address ranges for thoroughfares with similar directionality (e.g. north-south, or east-west streets) within the Address Reference System.

In theory, every street within an axial Address Reference System can be linked to an axis, either by intersection, or a virtual extension of the street centerline to the axis, or by interpolation (for streets that are set at an angle to the axes, and cannot be projected to intersect with only one of the axes). In practice, however, most jurisdictions with axial Address Reference System create a "grid" by using major through streets to create "blocks" of equal address ranges. For each Address Reference System Axis an Address

Reference System Axis Point Of Beginning must be identified. These elements are used only within Axial systems.

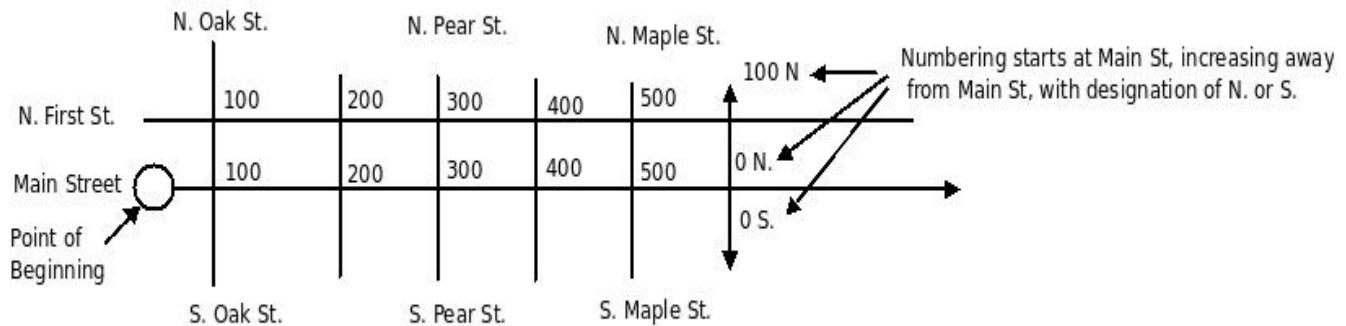
2.4.2.9 Reference Polyline, Breakpoint, and Breakline and Polygon Elements

The Reference Polyline, Breakpoint, Breakline, and Polygon elements are utilized primarily for quality assurance and address assignment purposes. These are optional elements used in Axial systems.

An address grid can be constructed by identifying the Address Reference System Range Breakpoints on a sufficient number of streets in the Address Reference System, and then joining equivalent breakpoints with an Address Reference System Range Breakline. By developing these breaklines, a set of areas are defined for each range of 100 (or some specified number of) numbers, and within them, shorter streets can be accurately addressed. If desired, the Address Reference System Range Breaklines can be used within a GIS environment to create polygons with equal address range values. These are then stored as Address Reference System Range Polygon. Streets used for the development of the breakpoints and breaklines (including the Address Reference System Axis elements) can be identified using the Address Reference System Reference Polyline element.

The Address Reference System Reference Polyline is illustrated below:

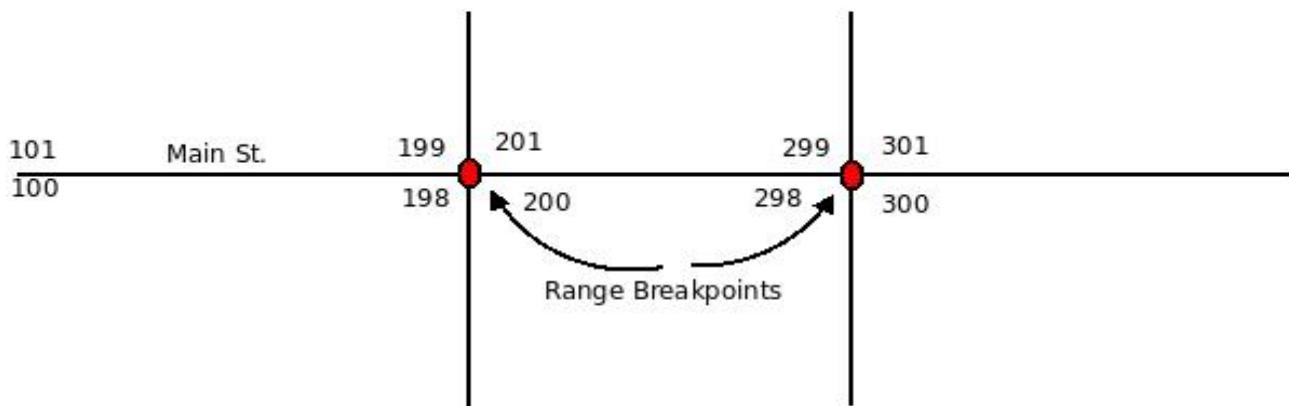
Address Reference System Reference Polyline



Main Street is a Reference Polyline for this Address Reference System
Streets parallel to Main Street are numbered in parallel as shown.
Streets crossing Main Street start their numbering at Main Street to both the north and the south.

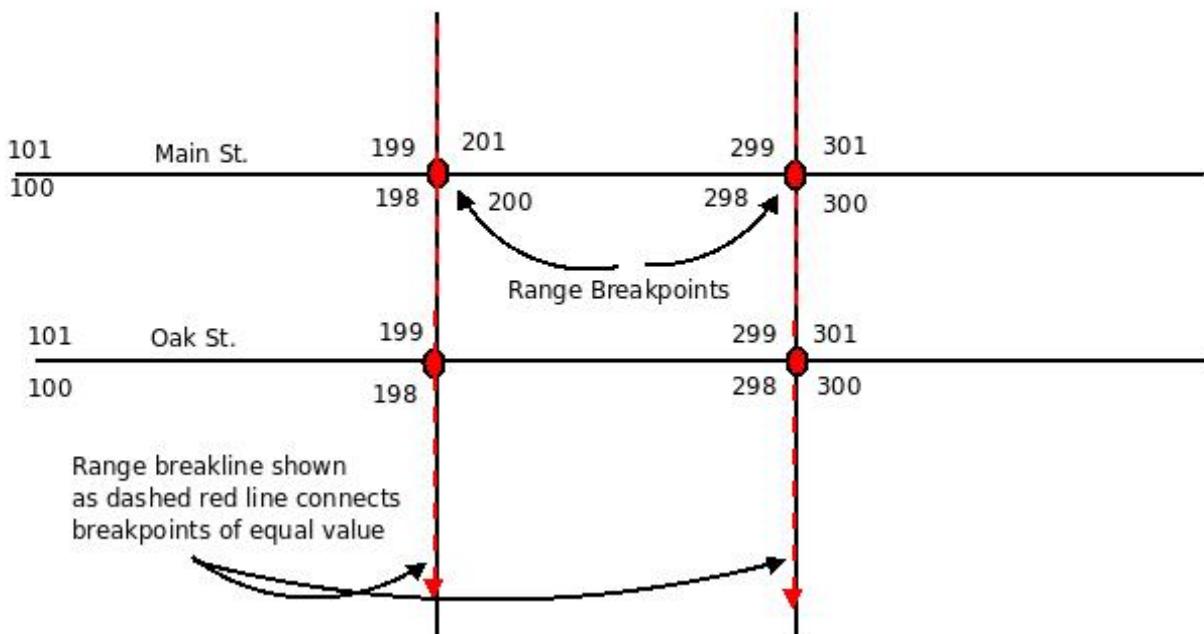
The Address Reference System Range Breakpoint is also illustrated below. The breakpoints are used in the construction of a grid by linking them into lines of the same value, and constructing range “contours.”

Address Reference System Range Breakpoint



The Address Reference System Range Breakline is illustrated below:

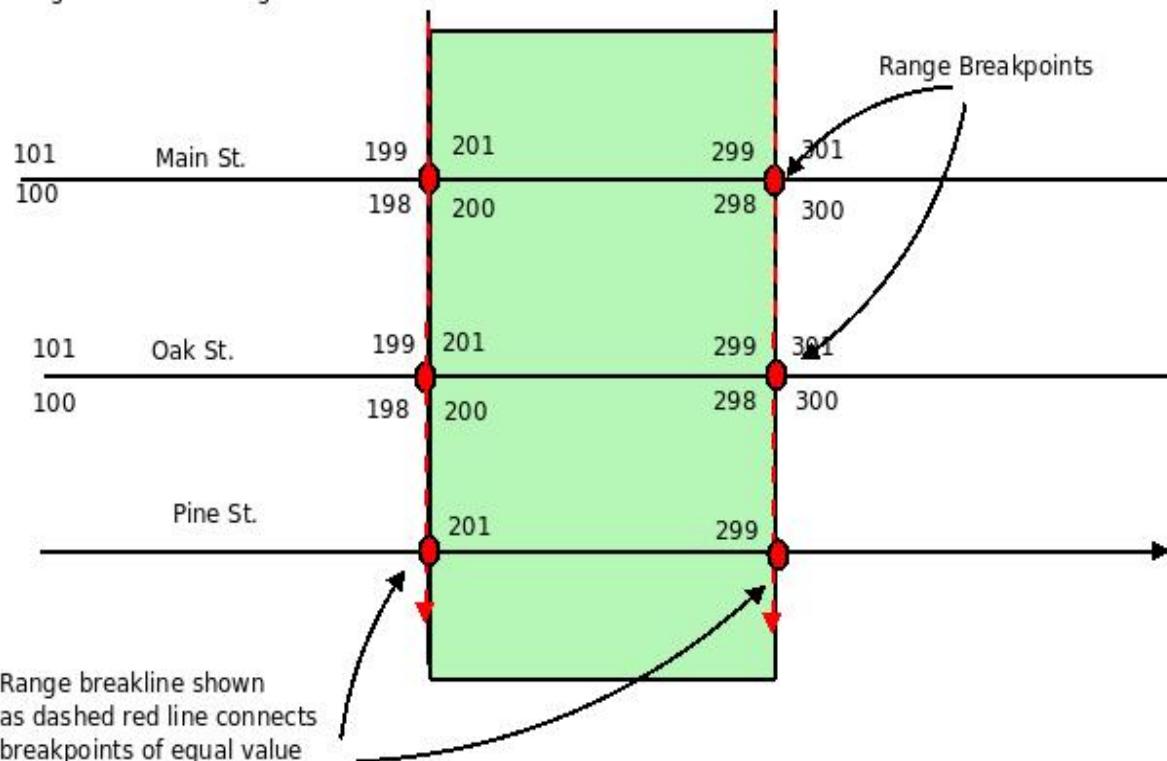
Address Reference System Range Breakline



These breaklines can then be used as contours, creating grids in both directions, with cells that can display the appropriate address ranges in either or both grid direction. This is illustrated below:

Address Reference System Range Polygon

Shaded Area is Range Polygon showing areas in which the range from 200 through 299 would be found on the east-west streets



Together, Address Reference System Axis, Address Reference System Reference Polyline, Address Reference System Range Breakpoint, Address Reference System Range Breakline, and Address Reference System Range Polygon form a geographic reference framework for the overall address numbering system within an axial Address Reference System. The framework guides assignment of new address numbers, and it provides the basis for important quality assurance tests.

2.4.3 Address Reference System Elements

2.4.3.1 Address Reference System Id

Element Name	AddressReferenceSystemId
Other common names for this element	
Definition	A unique identifier of the Address Reference System for a specified area (Address Reference System Extent).
Definition Source	New
Data Type	Integer
Existing Standards for this Element	None
Domain of Values for this Element	Locally defined
Source of Values	Local
How Defined (eg, locally, from standard, other)	Locally
Examples	For examples, see the Complex Element: Address Reference System.
Notes/Comments	The Address Reference System Id provides a reliable attribute to link an individual address record or a group of address records to a specific Address Reference System. This attribute identifies the specific rules that should be used in evaluating the address record. The Address Reference System Id must be unique to the Address Authority.
XML Tag	<AddressReferenceSystemId>
XML Model	<pre><xsd:simpleType name="AddressReferenceSystemId_type"> <xsd:restriction base="xsd:integer" /> </xsd:simpleType></pre>
XML Example	<AddressReferenceSystemId>55</AddressReferenceSystemId>

Quality Measures	DataTypeMeasure UniquenessMeasure
Quality Notes	

2.4.3.2 Address Reference System Name

Element Name	AddressReferenceSystemName
Other common names for this element	
Definition	The name of the address system used in a specified area (Address Reference System Extent).
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Locally defined
Source of Values	Local
How Defined (eg, locally, from standard, other)	Locally
Examples	For examples, see the Complex Element: Address Reference System.
Notes/Comments	In some cases, the Address Reference System Name may simply be the city or county name, such as "Town of Fairplay Address Reference System." In other cases, it may provide a name for the address reference system for a smaller area within a jurisdiction, such as "Boulder County Mountain Addressing System."
XML Tag	< AddressReferenceSystemName >
XML Model	<xsd:simpleType>

	<pre>name="AddressReferenceSystemName_type"> <xsd:restriction base="xsd:string" /> </xsd:simpleType></pre>
XML Example	<AddressReferenceSystemName>Mountain Addressing Scheme</AddressReferenceSystemName> <AddressReferenceSystemName>pre-1990 System</AddressReferenceSystemName>
Quality Measures	Tabular Domain Measure
Quality Notes	Where geometry for the address reference system is available, the boundaries should be checked as well to support spatial queries.

2.4.3.3 Address Reference System Authority

Element Name	AddressReferenceSystemAuthority
Other common names for this element	
Definition	The name of the authority or jurisdiction responsible for the creation and/or maintenance of an Address Reference System for a given area.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	None.
Source of Values	Local
How Defined	Defined locally
Example	City of Orono, ME; Commander, Bolling Air Force Base, Washington, DC
Notes/Comments	The agency responsible for creating or maintaining an Address Reference System may or may not be the same as the Address

	Authority responsible for assigning and maintaining the addresses in a given area.
XML Tag	< AddressReferenceSystemAuthority >
XML Model	<xsd:simpleType name="AddressReferenceSystemAuthority_type"> <xsd:restriction base="xsd:string" /> </xsd:simpleType>
XML Example	<AddressReferenceSystemAuthority>Commander, Bolling Air Force Base</AddressReferenceSystemAuthority> <AddressReferenceSystemAuthority>City of Orono</AddressReferenceSystemAuthority>
Quality Measure	Tabular Domain Measure
Quality Notes	

2.4.3.4 Address Reference System Extent

Element Name	AddressReferenceSystemExtent
Other common names for this element	
Definition	Boundary of the area(s) within which an Address Reference System is used.
Definition Source	New
Data Type	Geometry (Multisurface), as defined in the Open Geospatial Consortium's "OpenGIS(R) Geography Markup Language (GML)" version 3.1.1 (see Appendix A for a complete citation)
Existing Standards for this Element	NA
Domain of Values for this Element	Coordinate values within the geometric areal extent of the Address Reference System
Source of Values	Source of spatial data collection.

How Defined (eg, locally, from standard, other)	Locally defined.
Examples	<p>Address Reference System Extent:</p> <pre><gml:MultiSurface> <gml:surfaceMember> <gml:Polygon> <gml:exterior> <gml:LinearRing> <gml:posList>1000 1000 1000 25000 20000 1000 20000 25000 1000 1000</gml:posList> </gml:LinearRing> </gml:exterior> </gml:Polygon> </gml:surfaceMember> </gml:MultiSurface></pre>
Notes/Comments	<p>An Address Reference System may include the entire area of a city or county jurisdiction, or it may only include a portion thereof. Military bases, and some university campuses are addressed under Address Reference Systems that are maintained by the Base Commander for military bases, and by the State Department of Education (or the University system) for campuses. These often exist within the boundaries of a city, and are within county areas as well, but have their own schemes.</p> <p>Each Address Reference System is defined geographically, and should not (although many do so) overlap other Address Reference Systems that are in current use.</p> <p>Historical Address Reference System extents may be maintained, especially where an area under a county Address Reference System has been annexed into a city. The city may choose to maintain the county's numbering, and it will be useful, if additional development occurs, to have access to the previous Address Reference System to insure correct and consistent addressing with it.</p>
XML Tag	<pre>< AddressReferenceSystemExtent ></pre>
XML Model	<pre><xsd:complexType name="AddressReferenceSystemExtent_type"> <xsd:complexContent> <xsd:restriction base="gml:MultiSurfaceType" / > </xsd:complexContent> </xsd:complexType></pre>

XML Example	<pre><AddressReferenceSystemExtent> <gml:MultiSurface> <gml:surfaceMember> <gml:Polygon> <gml:exterior> <gml:LinearRing> <gml:posList>1000 1000 1000 25000 20000 1000 20000 25000 1000 1000</gml:posList> </gml:LinearRing> </gml:exterior> </gml:Polygon> </gml:surfaceMember> </gml:MultiSurface> </AddressReferenceSystemExtent></pre>
Quality Measures	None
Quality Notes	Check the boundary against the Address Reference System Rules.

2.4.3.5 Address Reference System Type

Element Name	AddressReferenceSystemType
Other common names for this element	
Definition	The category of address reference system in use. The type of reference system determines and guides the assignment of numbers within the Address Reference System Extent.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Yes: Axial, Linear Non-Axial, Area Based
Source of Values	FGDC Address Data Content Standard, Part One
How Defined	Local determination
Example	The Address Reference System for the District of Columbia is an

	axial (grid) system.
Notes/Comments	<ol style="list-style-type: none">1. An Address Reference System Type identifies the overall classification of the reference system.2. The types include:<ol style="list-style-type: none">a) Axial systems based on setting forth a framework consisting of streets, or other geometric lines to identify address numbering rules. Axial type systems include:<ol style="list-style-type: none">i) Grids based on either the street pattern, a geographic set of lines such as those forming the Public Land Survey System Grid, longitude and latitude lines or similar lines.ii) Radial patterns organized around primary arterial streets originating at a central point.b) Linear Non-axial systems, often found in areas of complex terrain where streets do not tend to travel in straight lines for any distance.<ol style="list-style-type: none">i) Distance based systems in which each road has a defined starting point, andii) Other types of linear organizational constructs that create a logical framework in which addresses are assigned.c) Area-based systems where the address numbers in a specified area are assigned by a non-geometric method, including chronological (where a number is assigned in the order in which a building or property is created regardless of its location), or by lot numbers (where these are not arranged in the usual sequential patterns found in axial and linear non-axial systems), or other means.3. Some of these systems may have sub-types. In grid systems, some provide for 100 numbers per "block", others are numbered sequentially without regard for block breaks. In places with radial street patterns, axis streets or lines may originate at one or more places. In some cases a grid or radial pattern may extend beyond its original area, and be expanded in an outlying area using numbering that is continued from the original area.4. The basis for numbering within any of these systems is created as an attribute of the system. Numbering rules are documented in the Address Reference System Numbering Ruleselement. It is expected to be applied consistently throughout the extent of the reference system, although in practice this is often not true. Additional information on Address Reference Systems may be found in the Address Reference Systems Introduction.
XML Tag	< AddressReferenceSystemType >

XML Model	<pre><xsd:simpleType name="AddressReferenceSystemType_type"> <xsd:restriction base="xsd:string"> <xsd:enumeration value="Axial"></xsd:enumeration> <xsd:enumeration value="Grid"></xsd:enumeration> <xsd:enumeration value="Radial"></xsd:enumeration> <xsd:enumeration value="Linear Non- Axial"></xsd:enumeration> <xsd:enumeration value="Distance"></xsd:enumeration> <xsd:enumeration value="Area Based"></xsd:enumeration> </xsd:restriction> </xsd:simpleType></pre>
XML Example	<AddressReferenceSystemType>Grid</AddressReferenceSystemType>
Quality Measure	Tabular Domain Measure
Quality Notes	

2.4.3.6 Complex Element: Address Reference System Rules

Element Name	AddressReferenceSystemRules
Other common names for this element	Addressing Rules
Definition	The rules by which address numbers, street names and other components of a thoroughfare address are determined.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Locally defined, see component elements
Source of Values	Local

How Defined	Defined locally, often by ordinance and encoded in terms of a spatial referencing system, described in the file-level metadata per FGDC's Content Standard for Digital Geospatial Metadata
Example	See component elements.
Notes/Comments	The rules are dependent upon the type of Address Reference System, and may also be explicitly provided in the component elements of Address Reference System Rules, or they may be referenced in the Address Reference System Reference Document Citation.
XML Tag	< AddressReferenceSystemRules >
XML Model	<pre> <xsd:complexType name="AddressReferenceSystem Rules_type"> <xsd:sequence> <xsd:element name="AddressReferenceSystemBlockRules" type="addr_type:AddressReferenceSystemBlock Rules_type" minOccurs="0" maxOccurs="unbounded"></xsd:element> <xsd:element name="AddressReferenceSystemNumberingRules" type="addr_type:AddressReferenceSystemNumbering Rules_type" minOccurs="0" maxOccurs="unbounded"></xsd: element> <xsd:element name="AddressReferenceSystemStreetNamingRules" type="addr_type:AddressReferenceSystemStreet NamingRules _type" minOccurs="0" maxOccurs="unbounded"></xsd: element> <xsd:element name="AddressReferenceSystemStreetTypeDirectiona l AndModfierRules" type="addr_type:AddressReference SystemStreet TypeDirectional AndModifierRules_type" minOccurs="0" maxOccurs="unbounded"> </xsd:element> <xsd:element name="AddressReferenceSystemPlaceNameStateCounty AndZipCodeRules" type="addr_type:Address ReferenceSystem PlaceNameStateCountry AndZipCodeRules_type" minOccurs="0" maxOccurs="unbounded"></xsd:element> <xsd:element name="AddressReferenceSystemSubaddressRules" type="addr_type:AddressReferenceSystem SubaddressRules _type" minOccurs="0" </pre>

	<pre>maxOccurs="unbounded"></xsd:element> </xsd:sequence> </xsd:complexType></pre>
Quality Measures	Address Reference System Rules Measure
Quality Notes	

2.4.3.6.1 Address Reference System Block Rules

Element Name	AddressReferenceSystemBlockRules
Other common names for this element	
Definition	This element defines a block in an Address Reference System, and sets forth the rules for block ranges and block breaks.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Locally defined
Source of Values	Local
How Defined	Defined locally, often by ordinance and encoded in terms of a spatial referencing systems, described in the file-level metadata per FGDC's Content Standard for Digital Geospatial Metadata
Example	<ol style="list-style-type: none">1. "A block is defined as a street segment between its points of intersection with other street segments at either end."2. A block shall contain 100 address numbers, and shall begin with the 00 value on one side, and the 01 value on the other side."3. "A block shall be defined as one mile along a single street regardless of the intersection of the street with any other streets."
Notes/Comments	Parity, meaning the definition of which side of a street shall be given

	the odd numbers and which side the even numbers in a range is defined in the Address Range Parity element.
XML Tag	<AddressReferenceSystemBlockRules>
XML Model	<pre> <xsd:simpleType name="AddressReferenceSystemBlockRules_type"> <xsd:restriction base="xsd:string" /> </xsd:simpleType> </pre>
XML Example	<AddressReferenceSystemBlockRules>A block is defined as a street segment between its points of intersection with other street segments at either end.</AddressReferenceSystemBlockRules>
Quality Measures	See Address Reference System Rules Measure.
Quality Notes	

2.4.3.6.2 Address Reference System Numbering Rules

Element Name	Address Reference System Numbering Rules
Other common names for this element	
Definition	The rules for numbering along a thoroughfare, including parity (odd/even side definition), and numbering increment distance and value.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Locally defined.
Source of Values	Local

How Defined	Defined locally
Example	<p>Address Numbering Rules: Odd numbers are on the south and west, and even numbers on the north and east sides of all streets. There will be one address increment allocated every 5.28 feet, resulting in 1000 addresses possible in each mile of road. The addresses will increase by a value of one unit at each increment.</p>
Notes/Comments	<ol style="list-style-type: none"> 1. In assigning addresses it is important to know which side of a street should be assigned odd numbers, and which even. 2. Additionally, the distance between numbers should be specified. In some cases, this is given as a number of feet or meters, while in others, it is given as a number of addresses per block or per mile. 3. The amount by which the address number is to be increased at each increment should be defined. In many cases the next sequential number is used, e.g. 1, 3, 5, etc., while in other cases, the increment may be 2 units, 4 units or any other number determined appropriate by the Address Reference System Authority. 4. If any specific numbers are to be prohibited for local reasons, these should be identified here as well. 5. The rules for how blocks are numbered and where breaks occur are listed in the Address Reference System Block Rules element.
XML Tag	<pre><AddressReferenceSystemNumberingRules></pre>
XML Model	<pre><xsd:simpleType name="AddressReferenceSystemNumberingRules_type" > <xsd:restriction base="xsd:string" /> </xsd:simpleType></pre>
XML Example	<pre><AddressReferenceSystemNumberingRules></pre> <ol style="list-style-type: none"> 1. In assigning addresses it is important to know which side of a street should be assigned odd numbers, and which even. 2. Additionally, the distance between numbers should be specified. In some cases, this is given as a number of feet or meters, while in others, it is given as a number of addresses per block or per mile. 3. The amount by which the address number is to be increased at each increment should be defined. In many cases the next sequential number is used, e.g. 1, 3, 5, etc., while in other cases, the increment may be 2 units, 4 units or any

	other number determined appropriate by the Address Reference System Authority. </AddressReferenceSystemNumberingRules>
Quality Measures	See Address Reference System Rules Measure.
Quality Notes	

2.4.3.6.3 Address Reference System Street Naming Rules

Element Name	AddressReferenceSystemStreetNamingRules
Other common names for this element	
Definition	The rules for the selection and use of street names within an Address Reference System
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Locally defined
Source of Values	Local
How Defined	Defined locally, often by ordinance or regulation
Example	<ol style="list-style-type: none"> 1. Street names shall not be duplicated within the extent of the City of Anywhere Address Reference System. 2. Streets running north-south shall be numbered, beginning at Main Street, and shall be called Avenues, while streets running east-west shall be given letter names (e.g. A, B, C) and shall be Streets. 3. Street names that are vulgar, profane, obscene, or contain racial, ethnic, religious or sexual terms shall not be permitted. 4. Streets within a subdivision shall have a theme, such as animals, birds, flowers, trees, etc. to unify the street naming and give the

	subdivision identity.
Notes/Comments	Specific street naming rules are helpful in maintaining unique street names and preserving existing patterns of street names that were historically established.
XML Tag	< AddressReferenceSystemStreetNamingRules >
XML Model	<pre> <xsd:simpleType name="AddressReferenceSystemStreetNamingRules_type"> <xsd:restriction base="xsd:string" /> </xsd:simpleType> </pre>
XML Example	<pre> <AddressReferenceSystemStreetNamingRules> 1. Street names shall not be duplicated within the extent of the City of Anywhere Address Reference System. 2. Streets running north-south shall be numbered, beginning at Main Street, and shall be called Avenues, while streets running east-west shall be given letter names (e.g. A, B, C) and shall be Streets. 3. Street names that are vulgar, profane, obscene, or contain racial, ethnic, religious or sexual terms shall not be permitted. 4. Streets within a subdivision shall have a theme, such as animals, birds, flowers, trees, etc. to unify the street naming and give the subdivision identify. </AddressReferenceSystemStreetNamingRules> </pre>
Quality Measures	See Address Reference System Rules Measure.
Quality Notes	See Address Reference System Rules Measure.

2.4.3.6.4 Address Reference System Street Type Directional and Modifier Rules

Element Name	AddressReferenceSystemStreetTypeDirectionalAndModifierRules
Other common names for this element	
Definition	Rules pertaining to the use of street types (suffix and prefix),

	directionals (prefix and suffix), and modifiers (prefix and suffix) of street names.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Locally defined
Source of Values	Local
How Defined	Defined locally, often by ordinance or regulation
Example	<ol style="list-style-type: none"> 1. Only those street types included in the Anytown Address Reference System list of street types may be used in Anytown. 2. Prefix types may be used. 3. Only the words "Old" and "New" may be used as Pre-Modifiers. The words "Extended," "Bypass" and "Overpass" may be used as post-modifiers.
Notes/Comments	<ol style="list-style-type: none"> 1. Many communities have specific rules about the street types that are permitted, and further rules about the functional classes of streets to which various types can be applied. For example, the type "Boulevard" may only be used with a primary arterial, while "Court" may only be used with a short (one block) cul-de-sac or dead-end road. Additionally, the use of prefix types (e.g. "Avenue B", or "Calle San Antonio") is regulated in some places. 2. The use of directionals is often complex. In some Axial Address Reference Systems, quadrants are defined for specific areas bounded by the Axes. In others, the part of the area in which a street is located is described by "North" or "West". The Address Reference System provides that these rules and the areas described for the use of directionals can be documented. 3. Modifiers are words that are separated from the name by either types or directionals. The use of these may be regulated by local rules, which are documented in this element. 4. The U.S. Postal Service, in Publication 28 provides a list of recognized street types, and directional values. The USPS does not recognize prefix types, and includes them with the Street Name (not recommended by this Standard), and also requires that any

	street type not included in Appendix C of Publication 28 be incorporated into the Street Name (also not recommended by this Standard). Modifiers are also not recognized separately by the USPS. For mailing purposes, the Complete Street Name element concatenates all of the parts of a Street Name, and is compatible with USPS standards.
XML Tag	< AddressReferenceSystemStreetTypeDirectionalAnd ModifierRules >
XML Model	<pre><xsd:simpleType name= "AddressReferenceSystemStreetTypeDirectionalAnd ModifierRules _type"> <xsd:restriction base="xsd:string" /> </xsd:simpleType></pre>
XML Example	<pre><AddressReferenceSystemStreetTypeDirectional AndModifierRules> 1. Only those street types included in the Anytown Address Reference System list of street types may be used in Anytown. 2. Prefix types may be used. 3. Only the words "Old" and "New" may be used as Pre-Modifiers. The words "Extended," "Bypass," and "Overpass" may be used as post-modifiers. </AddressReferenceSystemStreetTypeDirectional AndModifierRules></pre>
Quality Measures	See Address Reference System Rules Measure.
Quality Notes	

2.4.3.6.5 Address Reference System Place Name State Country And Zip Code Rules

Element Name	AddressReferenceSystemPlaceNameStateCountryAndZipCodeRules
Other common names for this element	
Definition	This element contains rules for the use of place names, state names, country names, and ZIP Codes within the jurisdiction of an Address Authority.
Definition	New

Source	
Data Type	characterString
Existing Standards for this Element	Existing Rules for State Name abbreviations and Country Name abbreviations (see those elements for citations).
Domain of Values for this Element	Locally defined
Source of Values	Local
How Defined	Defined locally, often by ordinance and regulation
Example	<ol style="list-style-type: none"> 1. "All addresses within the Extent of this Address Reference System shall have the Municipal Place Name of "Anytown" and the State Name of "OHIO"." 2. "The following community Place Names may be used within this Address Reference System Extent: New Hope, Pine Level, Red Oak Village. The areas of these communities are shown on the map attached to the Address Ordinance for Any County."
Notes/Comments	The combinations of place names with state names, and ZIP Codes are defined by the Address Authority for all areas within Address Reference System Extent. For all areas outside the Extent, which are found in the mailing addresses used by a local government, or other user, the USPS is usually the best source of the proper association of a place name (community, city or place) with a State Name, and ZIP Code. For Country Names, rules usually specify how a Country Name will be used (fully spelled out, abbreviated, etc.) may be documented here. Further information on the standards and rules that are applied to State Names and Country Names are found in the element descriptions.
XML Tag	<pre><AddressReferenceSystemPlaceNameStateCountryAnd ZipCodeRules ></pre>
XML Model	<pre><xsd:simpleType name= "AddressReferenceSystemPlaceNameStateCountryAnd ZipCodeRules_type"> <xsd:restriction base="xsd:string" /> </xsd:simpleType></pre>
XML Example	<pre><AddressReferenceSystemPlaceNameStateCountryAnd ZipCodeRules> 1. "All addresses within the Extent of this Address</pre>

	<p>Reference System shall have the Municipal Place Name of "Anytown" and the State Name of "OHIO"."</p> <p>2. "The following community Place Names may be used within this Address Reference System Extent: New Hope, Pine Level, Red Oak Village. The areas of these communities are shown on the map attached to the Address Ordinance for Any County."</p> <pre></AddressReferenceSystemPlaceNameStateCountryAndZipCodeRules></pre>
Quality Measures	See Address Reference System Rules Measure.
Quality Notes	

2.4.3.6.6 Address Reference System Subaddress Rules

Element Name	AddressReferenceSystemSubaddressRules
Other common names for this element	
Definition	The rules that are applied to the addressing of areas within structures as subaddresses (units, suites, apartments, spaces, etc.) within a given Address Reference System
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Locally defined
Source of Values	Local
How Defined	Defined locally, often by ordinance or procedures manual.
Example	1. Apartments are addressed using a four digit number where the first number represents the building, the second number the floor on which the unit is located, and the third and fourth numbers the

	<p>individual apartment unit.</p> <p>2. In a multi-story building, suites will be numbered in a clockwise manner from the elevator lobby, using even numbers on the right hand side, and odd numbers on the left hand side of the hallway. If the hallway is a single corridor, then the numbers will be assigned from one end of the structure to the other, in the same direction as the addresses on the street on which the building is addressed.</p>
Notes/Comments	The rules for subaddresses may include the methods by which subaddresses are applied in a given situation. The rules may also specify the words that are allowed to identify subaddress types, such as unit, suite, space, apartment, and to prohibit the use of others.
XML Tag	< AddressReferenceSystemSubaddressRules >
XML Model	<xsd:simpleType name="AddressReferenceSystemSubaddressRules_type" > <xsd:restriction base="xsd:string" /> </xsd:simpleType>
XML Example	<AddressReferenceSystemSubaddressRules> 1. Apartments are addressed using a four-digit number where the first number represents the building, the second number the floor on which the unit is located, and the third and fourth numbers the individual apartment unit. 2. In a multi-story building, suites will be numbered in a clockwise manner from the elevator lobby, using even numbers on the right hand side, and odd numbers on the left hand side of the hallway. If the hallway is a single corridor, then the numbers will be assigned from one end of the structure to the other, in the same direction as the addresses on the street on which the building is addressed. </AddressReferenceSystemSubaddressRules>
Quality Measures	See Address Reference System Rules Measure.
Quality Notes	

2.4.3.7 Address Reference System Axis

Element Name	AddressReferenceSystemAxis
Other common names for this element	
Definition	The line that defines the points of origin for address numbering along thoroughfares that intersect it, or which are numbered in parallel to streets that intersect it. It may be a road, another geographic feature, or an imaginary line.
Definition Source	New
Data Type	Geometry (Multicurve), as defined in the Open Geospatial Consortium's "OpenGIS(R) Geography Markup Language (GML)" version 3.1.1 (see Appendix A for a complete citation)
Existing Standards for this Element	None
Domain of Values for this Element	Locally defined
Source of Values	Local
How Defined	Defined locally, often by ordinance and encoded in terms of a spatial referencing systems, described in the file-level metadata per FGDC's Content Standard for Digital Geospatial Metadata
Example	<p>Address Reference System Axis:</p> <pre><gml:MultiCurve> <gml:curveMember> <gml:Curve> <gml:segments> <gml:LineStringSegment> <gml:posList>1000 15000 20000 15000 </gml:posList> </gml:LineStringSegment> </gml:segments>/gml:Curve> </gml:curveMember> </gml:MultiCurve></pre>
Notes/Comments	<ol style="list-style-type: none"> 1. An Address Reference System Axis creates the beginning point for assigning Complete Address Numbers to thoroughfares that cross it, and it may guide the assignment of Complete Address Numbers along parallel thoroughfares.

	<ol style="list-style-type: none">2. An Address Reference System Axis is typically a road, but it may also be a line derived from a Public Land Survey System (PLSS) grid or a river (common in riverfront cities), a rail line, or an imaginary line (e.g. the east-west centerline of the national mall in Washington, DC).3. Axis lines may cross, radiate, or branch.4. It may also provide a "measuring device" for the extension of numbers along parallel streets, especially where there is a gap in development within a scheme.5. Axis lines may also define quadrants or areas in which certain directionals may be required for street names and addresses.
XML Tag	< AddressReferenceSystemAxis >
XML Model	<pre><xsd:complexType name="AddressReferenceSystemAxis_type"> <xsd:complexContent> <xsd:restriction base="gml:MultiCurveType"> </xsd:restriction> </xsd:complexContent> </xsd:complexType></pre>
XML Example	<pre><AddressReferenceSystemAxis> <gml:MultiCurve> <gml:curveMember> <gml:Curve> <gml:segments> <gml:LineStringSegment> <gml:posList>1000 15000 20000 15000 </gml:posList> </gml:LineStringSegment> </gml:segments>/gml:Curve> </gml:curveMember> </gml:MultiCurve> </AddressReferenceSystemAxis></pre>
Quality Measures	Address Reference System Axes Point Of Beginning Measure
Quality Notes	

2.4.3.7.1 Address Reference System Axis Point of Beginning

Element Name	AddressReferenceSystemAxisPointOfBeginning
Other common names for this element	Axis Origin Point
Definition	Coordinate location of the beginning point of address numbering along an Address Reference System Axis.
Definition Source	New
Data Type	Geometry (Point) as defined in the Open Geospatial Consortium's "OpenGIS(R) Geography Markup Language (GML)" version 3.1.1 (see Appendix A for a complete citation)
Existing Standards for this Element	N/A
Domain of Values for this Element	Coordinate location of the beginning point for address numbers along an address axis.
Source of Values	Source of spatial data collection.
How Defined (eg, locally, from standard, other)	Point location defined locally, often by ordinance, and encoded in terms of a spatial referencing system, described in file-level metadata per FGDC's Content Standard for Geospatial Metadata.
Example	<p>Definition For Washington DC: The US Capitol Building (point of origin for North, South, and East Capitol Streets and the Capitol Mall, which divide DC into four quadrants, NW, NE, SE, and SW). Address numbers increase along those four axes as one travels away from the Capitol Building, and all other streets are addressed more or less in parallel with one of the axis streets, and every address must include a quadrant designation.</p> <p>Element :</p> <pre><gml:Point> <gml:pos>15000,15000</gml:pos> </gml:Point></pre>

	For additional examples, please see the Complex Element: Address Reference System
Notes/Comments	The origin point for an Address Reference System Axis may be the same or may differ from the origin point for other Address Reference System Axis lines in the same Address Reference System.
XML Tag	< AddressReferenceSystemAxisPointOfBeginning >
XML Model	<pre><xsd:complexType name="AddressReferenceSystemAxisPointOfBeginning" type="gml:PointType"> <xsd:complexContent> <xsd:extension base="gml:PointType"></xsd:extension> </xsd:complexContent> </xsd:complexType></pre>
XML Example	<AddressReferenceSystemAxisPointOfBeginning> <gml:Point> <gml:pos>15000,15000</gml:pos> </gml:Point> </AddressReferenceSystemAxisPointOfBeginning>
Quality Measures	Address Reference System Axes Point Of Beginning Measure
Quality Notes	If the Address Reference System Rules specifies that the Address Reference System Axis Point Of Beginning for one Address Reference System Axis is at the intersection of another Address Reference System Axis, then use Address Reference System Axes Point Of Beginning Measure.

2.4.3.8 Address Reference System Grid Angle

Element Name	AddressReferenceSystemGridAngle
Other common names for this element	
Definition	The degree to which a specific, named address grid is tilted off a north/south or east/west orientation.

Definition Source	New
Data Type	Character
Existing Standards for this Element	None
Domain of Values for this Element	Locally defined
Source of Values	Local
How Defined	Defined locally, often by ordinance and encoded in relationship to an address referencing systems, described in the file-level metadata per FGDC's Content Standard for Digital Geospatial Metadata
Example	Address Reference System Grid Angle "The City of Motown grid is tilted at 32 degrees to true north."
Notes/Comments	1. An Address Reference System Grid Angle describes the angle at which an address grid or reference system consisting of mainly rectangular blocks is tilted or skewed from a true north-south orientation. Such tilting occurs for a number of reasons, including grids based on natural features which are at an angle to the cardinal directions, railroads and major highways that traverse the address reference system at an angle, or other local factors. The angle may have an effect on what directionals are used, and may create confusion when the directionals are referencing the grid rather than the actual compass directions. This attribute will be useful in developing correct assumptions concerning the assignment and quality assurance testing of directionals within the address reference system.
XML Tag	<AddressReferenceSystemGridAngle>
XML Model	<pre><xsd:simpleType name="AddressReferenceSystemGridAngle_type"> <xsd:restriction base="xsd:double" /> </xsd:simpleType></pre>
XML Example	<AddressReferenceSystemGridAngle> 66.5 </AddressReferenceSystemGridAngle>

Quality Measures	AddressReferenceSystemRulesMeasure
Quality Notes	

2.4.3.8.1 Address Reference System Reference Polyline

Element Name	ADDRstandard.AddressReferenceSystemReferencePolyline
Other common names for this element	
Definition	A street, geometric line, or other line used to measure address number assignment intervals and ranges within an Address Reference System. The Address Reference System Reference Polyline may consist of a beginning point, one or more segments of a street centerline, geographically identified line, such as a line of latitude or longitude, a land-division based line, such as a township, range, or section line, or an imaginary line constructed for the purpose of allocating address ranges and address numbers.
Definition Source	New
Data Type	Geometry (Multicurve), as defined in the Open Geospatial Consortium's "OpenGIS(R) Geography Markup Language (GML)" version 3.1.1 (see Appendix A for a complete citation)
Existing Standards for this Element	None
Domain of Values for this Element	Can be created locally.
Source of Values	Local jurisdiction
Attributes Associated with this Element	Address Range Side, Address Range Parity, Address Range Span, Address Range Type, Address Reference System Range Breakpoint, Address Reference System Range Breakline
How Defined	Locally

Example	<p>Address Reference System Reference Polyline:</p> <pre><gml:MultiCurve> <gml:curveMember> <gml:Curve> <gml:segments> <gml:LineStringSegment> <gml:posList>1000 15000 20000 15000 </gml:posList> </gml:LineStringSegment> </gml:segments>/gml:Curve> </gml:curveMember> </gml:MultiCurve></pre>
Notes/Comments	<p>Theoretically, every street or other access route to an address within an Address Reference System can be construed as an Address Reference System Reference Polyline. However, in practice, where a framework of axes exists, a selection of major through streets is often used to identify breaks in address ranges, and to assist in locating the correct Address Range for a given local street. Every Complete Address Number is related to an Address Reference System Reference Polyline.</p> <ol style="list-style-type: none">1. In an axial type Address Reference System, all Address Reference System Reference Polylines are, or could, by extension, be connected to one of the Address Reference System Axislines. Each of the Address Reference System Reference Polylines has its Point of Beginning at the vertex of its intersection with the axis.2. In a non-axial Address Reference System, a specific Point of Beginning is defined by the Address Reference System Authority for each Address Reference System Reference Polyline at the point where numbering for that polyline is commenced.
XML Tag	< AddressReferenceSystemReferencePolyline >
XML Model	<xsd:complexType name="AddressReferenceSystemReferencePolyline_type"> <xsd:complexContent> <xsd:restriction base="gml:MultiCurveType"></xsd:restriction> </xsd:complexContent> </xsd:complexType>

XML Example	<pre><AddressReferenceSystemReferencePolyline> <gml:MultiCurve> <gml:curveMember> <gml:Curve> <gml:segments> <gml:LineStringSegment> <gml:posList>1000 15000 20000 15000 </gml:posList> </gml:LineStringSegment> </gml:segments>/gml:Curve> </gml:curveMember> </gml:MultiCurve> </AddressReferenceSystemReferencePolyline></pre>
Quality Measures	See Address Reference System Rules Measure.
Quality Notes	

2.4.3.8.2 Address Reference System Range Breakpoint

Element Name	AddressReferenceSystemRangeBreakpoint
Other common names for this element	
Definition	A point along a street or other thoroughfare within an Address Reference System where an address range beginning and/or endpoint is located.
Definition Source	New
Data Type	Geometry (Point), as defined in the Open Geospatial Consortium's "OpenGIS(R) Geography Markup Language (GML)" version 3.1.1 (see Appendix A for a complete citation)
Existing Standards for this Element	None
Domain of Values for this Element	Can be created locally.
Source of Values	Local jurisdiction

Attributes Associated with this Element	Address Range Span, Address Range Side, Address Range Parity, Address Reference System Range Breakline
How Defined	By Address Reference System rules
Example	Address Reference System Range Breakpoint: <gml:Point> <gml:pos>15000,15000</gml:pos> </gml:Point>
Notes/Comments	<p>1. Address Reference System Range Breakpoints may occur at intersections, or they may be defined by distances, or address number increments. They represent the point at which one address range is ended, and another begins. This is usually defined at the break from one series of 100 to the next, where ranges are defined as 100-199, 200-299, etc. In an axial typeAddress Reference System, where a grid of streets is formed, these breakpoint almost always occur at intersections. Where an axial system is based on other geometry, such as township/range/section lines, they may occur at the point where one unit ends and the next begins (e.g. a section line, or township or range line). In a non-axial system, ranges are normally based on distance (e.g. 1000 numbers per mile), and the breakpoints may be identified by their distance from the 0 point for the road.</p> <p>2. Address Reference System Range Breakpoints may be connected within the Address Reference System Extent to other points having the same value (connecting all the points that represent the breakpoint between the 100-199 Address Range and the 200-299 Address Range) to create an Address Reference System Range Breakline. Such Address Reference System Range Breaklines are useful in assignment of new addresses, and in quality review of existing references to determine whether or not they fall within the Address Range with which they are associated. For further information on Address Reference System Range Breaklines, refer to the element.</p>
XML Tag	<AddressReferenceSystemRangeBreakpoint>
XML Model	<pre> <xsd:complexType name="AddressReferenceSystemRangeBreakpoint_type" > <xsd:complexContent> <xsd:extension base="gml:PointType"> </xsd:extension> </pre>

	</xsd:complexContent> </xsd:complexType>
XML Example	<AddressReferenceSystemRangeBreakpoint> <gml:Point> <gml:pos>15000,15000</gml:pos> </gml:Point> </AddressReferenceSystemRangeBreakpoint>
Quality Measures	See Address Reference System Rules Measure.
Quality Notes	

2.4.3.8.3 Address Reference System Range Breakline

Element Name	ADDRstandard.AddressReferenceSystemRangeBreakline
Other common names for this element	
Definition	A line connecting the Address Reference System Range Breakpoints with the same value within an Address Reference System
Definition Source	New
Data Type	Geometry (Multicurve), as defined in the Open Geospatial Consortium's "OpenGIS(R) Geography Markup Language (GML)" version 3.1.1 (see Appendix A for a complete citation)
Existing Standards for this Element	None
Domain of Values for this Element	Based on range values in Address Reference System.
Source of Values	Local jurisdiction
Attributes Associated with this Element	
How Defined	

Example	<p>Address Reference System Range Breakline:</p> <pre><gml:MultiCurve> <gml:curveMember> <gml:Curve> <gml:segments> <gml:LineStringSegment> <gml:posList>1000 15000 20000 15000 </gml:posList> </gml:LineStringSegment> </gml:segments>/gml:Curve> </gml:curveMember> </gml:MultiCurve></pre>
Notes/Comments	<p>The Address Reference System Range Breakline provides address assignment and quality assurance personnel with a means of identifying which ranges apply within a given area of an Address Reference System. In axial (or grid) type systems, with roughly rectangular blocks, these lines should be relatively straight and parallel. However, in less regular topography, or where the street pattern is more irregular, these lines may converge or diverge. They should not cross.</p> <p>The lines are constructed in an axial system by connecting all of the Address Reference System Range Breakpoints that have identical values (for example those that represent the beginning of the "1200" block, and where the low values are 1200 and 1201 for left low and right low.)</p>
XML Tag	< AddressReferenceSystemRangeBreakline >
XML Model	<xsd:complexType name="AddressReferenceSystemRangeBreakline_type" > <xsd:complexContent> <xsd:restriction base="gml:MultiCurveType"> </xsd:restriction> </xsd:complexContent> </xsd:complexType>
XML Example	<AddressReferenceSystemRangeBreakline> <gml:MultiCurve> <gml:curveMember>

	<pre><gml:Curve> <gml:segments> <gml:LineStringSegment> <gml:posList>1000 15000 20000 15000 </gml:posList> </gml:LineStringSegment> </gml:segments>/gml:Curve> </gml:curveMember> </gml:MultiCurve> </AddressReferenceSystemRangeBreakline></pre>
Quality Measures	See Address Reference System Rules Measure.
Quality Notes	

2.4.3.8.4 Address Reference System Range Polygon

Element Name	AddressReferenceSystemRangePolygon
Other common names for this element	
Definition	A polygon created by connecting the Address Reference System Range Breaklines with the same value within an Address Reference System
Definition Source	New
Data Type	Geometry (Multisurface), as defined in the Open Geospatial Consortium's "OpenGIS(R) Geography Markup Language (GML)" version 3.1.1 (see Appendix A for a complete citation)
Existing Standards for this Element	None
Domain of Values for this Element	Based on range values in Address Reference System.
Source of Values	Local jurisdiction
Attributes Associated with	Address Reference System Range Breakpoint, Address Reference System Range Breakline, Address Reference System Reference

this Element	Polyline
How Defined	
Example	<p>Address Reference System Range Polygon:</p> <pre><gml:MultiSurface> <gml:surfaceMember> <gml:Polygon> <gml:exterior> <gml:LinearRing> <gml:posList>1000 1000 1000 25000 20000 1000 20000 25000 1000 1000</gml:posList> </gml:LinearRing> </gml:exterior> </gml:Polygon> </gml:surfaceMember> </gml:MultiSurface></pre>
Notes/Comments	<p>The Address Reference System Range Polygon provides address assignment and quality assurance personnel with a means of identifying which ranges apply within a given area of an Address Reference System. In axial (or grid) type systems, with roughly rectangular blocks, these polygons should create an area of a long band where all of the addresses are or should be within a given block range. However, in less regular topography, or where the street pattern is more irregular, these polygons may be less coherent. They must not overlap.</p> <p>The lines are constructed in an axial system by connecting all of the Address Reference System Range Breaklines that have identical values and extending the polygon to the Address Reference System Range Breakline with the next higher value (for example those that represent the beginning of the "1200" block, and where the low values are 1200 and 1201 for left low and right low.)</p>
XML Tag	<pre>< AddressReferenceSystemRangePolygon ></pre>
XML Model	<pre><xsd:complexType name="AddressReferenceSystemRangePolygon_type"> <xsd:complexContent> <xsd:restriction base="gml:MultiSurfaceType"></pre>

	</xsd:restriction> </xsd:complexContent> </xsd:complexType>
XML Example	<AddressReferenceSystemRangePolygon> <gml:MultiSurface> <gml:surfaceMember> <gml:Polygon> <gml:exterior> <gml:LinearRing> <gml:posList>1000 1000 1000 25000 20000 1000 20000 25000 1000 1000</gml:posList> </gml:LinearRing> </gml:exterior> </gml:Polygon> </gml:surfaceMember> </gml:MultiSurface> </AddressReferenceSystemRangePolygon>
Quality Measures	See Address Reference System Rules Measure.
Quality Notes	

2.4.3.9 Address Reference System Reference Document Citation

Element Name	AddressReferenceSystemReferenceDocumentCitation
Other common names for this element	Address Ordinance, Address Manual
Definition	A bibliographic reference to an ordinance, map, manual, or other document in which the rules governing an Address Reference System are written.
Definition Source	New
Data Type	characterString
Existing Standards for this Element	None
Domain of Values for this Element	Locally defined

Source of Values	Local
How Defined	Defined locally
Example	"Rules for the Anytown Address Reference System are found in the Anytown Address Ordinance, Chapter 15, Sections 1-29, of the Anytown Municipal Code (www.ci.anytown.na.us)"
Notes/Comments	The citation should be used initially, until all of the rules are documented within the Address Reference System Rules elements. However, once all of the rules are documented, the citation must be maintained to provide valuable source information for users.
XML Tag	< AddressReferenceSystemReferenceDocumentCitation >
XML Model	<xsd:simpleType name="AddressReferenceSystemReferenceDocument Citation _type"> <xsd:restriction base="xsd:string" /> </xsd:simpleType>
XML Example	<AddressReferenceSystemReferenceDocumentCitation> "Rules for the Anytown Address Reference System are found in the Anytown Address Ordinance, Chapter 15, Sections 1-29, of the Anytown Municipal Code (www.ci.anytown.na.us)" </AddressReferenceSystemReferenceDocumentCitation>
Quality Measures	None
Quality Notes	

2.4.3.10 Complex Element: Address Reference System

Element Name	AddressReferenceSystem
Other common names for this element	Addressing system, address numbering system, address numbering grid, house numbering system, street numbering system
Definition	An Address Reference System is a set of rules and geometries that define how addresses are assigned along thoroughfares and/or within a given area (Address Reference System Extent). At minimum, an Address Reference System must specify where Complete Address Number

	<p>sequences begin and how Complete Address Numbers are assigned along the length of thoroughfares governed by the Address Reference System within the Address Reference System Extent. Address Reference Systems typically provide rules governing left-right parity of Complete Address Numbers, assignment of Street Names and street types, use of directionals and quadrants, and other aspects of address assignment. An Address Reference System that is based on axis lines, an Address Reference System Axis defined for each axis used to define address assignment. Each Address Reference System Axis must have an identified Address Reference System Axis Point Of Beginning. An Address Reference System is known by its Address Reference System Name (required). Additional business rules for an Address Reference System are described in the Address Reference System Rules.</p>
Definition Source	New
Data Type	Abstract
Existing Standards for this Element	Refer to Component Elements
Domain of Values for this Element	Refer to Component Elements
Source of Values	Refer to Component Elements
How Defined (eg, locally, from standard, other)	Refer to Component Elements
Example	<p>Address Reference System Name: Metro City Address Grid</p> <p>Address Reference System Axis Point Of Beginning:</p> <pre><gml:Point> <gml:pos>15000,15000</gml:pos> </gml:Point></pre> <p>Address Reference System Axis:</p> <pre><gml:MultiCurve> <gml:curveMember> <gml:Curve> <gml:segments></pre>

```
<gml:LineStringSegment>
<gml:posList>1000 15000 20000 15000
</gml:posList>
</gml:LineStringSegment>
</gml:segments>/gml:Curve>
</gml:curveMember>
</gml:MultiCurve>
Address Reference System Axis Point Of Beginning:
<gml:Point>
<gml:pos>15000,15000</gml:pos>
</gml:Point>
Address Reference System Axis:
<gml:MultiCurve>
<gml:curveMember>
<gml:Curve>
<gml:segments>
<gml:LineStringSegment>
<gml:posList>1000 15000 20000 15000
</gml:posList>
</gml:LineStringSegment>
</gml:segments>/gml:Curve>
</gml:curveMember>
</gml:MultiCurve>Address Reference System Extent:
<gml:MultiSurface>
<gml:surfaceMember>
<gml:Polygon>
<gml:exterior>
<gml:LinearRing>
<gml:posList>1000 1000 1000 25000 20000 1000 20000 25000
1000 1000</gml:posList>
</gml:LinearRing>
</gml:exterior>
```

	<pre></gml:Polygon> </gml:surfaceMember> </gml:MultiSurface></pre> <p>Address Reference System Rules: Written information about parity, street naming conventions, numbering intervals, grids, and other business rules. (Contains elements including Address Reference System Block Rules, Address Reference System Numbering Rules, Address Reference System Street Naming Rules, Address Reference System Street Type Directional And Modifier Rules, Address Reference System Place Name State Country And Zip Code Rules)</p> <p>Address Reference System Authority: Name of agency (municipality, county, other) that has authority over the scheme's business rules, extent and other parameters.</p>
Notes/Comments	<ol style="list-style-type: none">1. Address Reference System Extents may overlap.2. There are three broad types of Address Reference Systems: Axial, linear non-axial and area based.<ul style="list-style-type: none">* Axial The Address Reference System is based on streets or geometric lines, which form the basis for address numbering. The axes are often oriented more or less at 90 degrees to each other to define quadrants or directionals. The grid may be defined by topography, rivers, rail lines, or other features. This is by far the most common type in the United States; Chicago is but one of many clear examples.* Linear Non-axial. Each thoroughfare has its own beginning point for Complete Address Numbers, independent of the other thoroughfares in the Address Reference System. This is common, for example, in rural areas where the road network is sparse and street segments are long. This term may also apply to places where the address numbers are not based on thoroughfares at all.* Area-based. An Address Reference System may not be based on street geometry, but number assignment is done according to chronology (when a structure was addressed), or parcel or lot numbers.3. A jurisdiction may have more than one addressing scheme within its area, and its Address Reference System(s) may change over time. Occasionally addresses from different schemes are intermingled along the same block face, which complicates the assignment of an address range to that block face. This may be the result of annexation of developed properties with existing addresses from one jurisdiction to another.
XML Tag	< AddressReferenceSystem >

XML Model

```
<xsd:complexType name="AddressReferenceSystem" >
<xsd:sequence>
<xsd:element name="AddressReferenceSystemId"
  type="addr_type:AddressReferenceSystemId_type"
  maxOccurs="1" minOccurs="1"/>
<xsd:element name="AddressReferenceSystemName"
  type="addr_type:AddressReferenceSystemName_type"
  maxOccurs="1" minOccurs="1"/>
<xsd:element name="AddressReferenceSystemAuthority"
  type="addr_type:AddressReferenceSystem
  Authority_type" maxOccurs="1" minOccurs="0"/>
<xsd:element name="AddressReferenceSystemExtent"
  type="addr_type:AddressReferenceSystemExtent_type"
  maxOccurs="1" minOccurs="0"/>
<xsd:element name="AddressReferenceSystemType"
  type="addr_type:AddressReferenceSystemType_type"
  maxOccurs="1" minOccurs="0"/>
<xsd:element name="AddressReferenceSystemRules"
  type="addr_type:AddressReferenceSystemRules_type"
  maxOccurs="1" minOccurs="0"/>
<xsd:element name="AddressReferenceSystemAxis"
  type="addr_type:AddressReferenceSystemAxis_type"
  maxOccurs="1" minOccurs="0"/>
<xsd:element
  name="AddressReferenceSystemAxisPointOfBeginning"
  type="addr_type:AddressReferenceSystemAxisPointOf
  Beginning _type" maxOccurs="1" minOccurs="0"/>
<xsd:element name="AddressReferenceSystemGridAngle"
  type="addr_type:AddressReferenceSystem
  GridAngle_type" maxOccurs="1" minOccurs="0"/>
<xsd:element name="AddressReferenceSystemReference
  Polyline" type="addr_type:AddressReferenceSystem
  ReferencePolyline _type" maxOccurs="unbounded"
  minOccurs="0"/>
<xsd:element
  name="AddressReferenceSystemRangeBreakpoint"
  type="addr_type:AddressReferenceSystemRange
  Breakpoint _type" maxOccurs="1" minOccurs="0"/>
<xsd:element
  name="AddressReferenceSystemRangeBreakline"
  type="addr_type:AddressReferenceSystemRange
  Breakline _type" maxOccurs="unbounded"
  minOccurs="0"/>
<xsd:element
  name="AddressReferenceSystemReferenceDocumentCitation"
  type="addr_type:AddressReferenceSystem
  Reference DocumentCitation_type"
  maxOccurs="unbounded" minOccurs="0"/>
</xsd:sequence>
</xsd:complexType>
```

XML Example	<pre><AddressReferenceSystem> <AddressReferenceSystemId>MCAG Unified</AddressReferenceSystemId> <AddressReferenceSystemName>Metro City Address Grid</AddressReferenceSystemName> <AddressReferenceSystemType>Grid</AddressReference SystemType> </AddressReferenceSystem></pre>
Quality Measures	Address Reference System Rules Measure
Quality Notes	

3. Part 2: Address Data Classification

3.1 *Introduction*

3.1.1 Basis for Classification

The classification part of this standard classifies addresses according to their syntax, that is, their address elements and the order in which the elements are arranged. Syntax determines the record structure needed to hold and exchange an address, and often it is all that is known about the addresses in a given file.

Classifying addresses by syntax rather than semantics (i.e. meaning) allows the users of the standard to focus on record structures, and to avoid making any assumptions about what Address Feature Type the address might identify. Classifying addresses by Address Feature Type can be frustrating or impossible because:

1. Reliable information about an address may be unavailable.
2. Often, one address is used to identify several types of features (e.g., parcel, building, building entrance, utility meter, utility pole, incident location, etc.) at the same location.
3. Address Feature Type categories may be found to be ambiguous or incomplete when applied to a given address.

3.1.2 Organization

The classes are presented in four broad groups:

1. **Thoroughfare addresses** specify a location by reference to a thoroughfare.
2. **Landmark addresses** specify a location by reference to a named landmark.
3. **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, overseas military addresses, or general delivery offices.
4. The **general address class** may include addresses from any or all of the other classes, or addresses whose class is unknown, or whose syntax does not conform to any of the thoroughfare, landmark, and postal classes.

Each class is described by giving its:

1. **Name:** The name of the class.
2. **Syntax:** The address elements required and permitted in the class, and the order in which they are arranged.
3. **Defining Characteristics:** The elements and arrangement that distinguish this class from the other classes.
4. **Examples:** Illustrative examples of the class.
5. **Notes:** Explanatory notes about the class.
6. **XML Tag:** The XML tag for the class.

7. **XML Model:** XML model of the class.
8. **XML Example:** The XML model applied to a specific example of the class.
9. **XML Notes:** Explanatory notes about the XML model.
10. **Quality Measures:** Data quality tests applied to the class.
11. **Quality Notes:** Explanatory notes about the data quality measures applied to this class.

3.1.3 Formatting Conventions

Syntax and Formatting. The following notation is used to show how classes are constructed from elements:

{ } enclose the name of an element.

* indicates that the element is **required** in addresses of that class. Otherwise the element may be omitted when desired.

+ indicates "and" (concatenation), with a space implied between each component unless stated otherwise.

Example: { Complete Address Number * } + { Complete Street Name * } + { Complete Subaddress }

Complex Elements Include All Combinations of Their Component Elements. To avoid a multiplicity of insignificant permutations and combinations, complex elements are used to represent the various combinations of the simple elements that comprise them. Thus, for example, {CompleteAddressNumber} includes all of the following combinations:

1. { Address Number * }
2. { Address Number* } + { Address Number Suffix }
3. { Address Number* } + { Separator Element } + { Address Number Suffix }
4. { Address Number Prefix } + { Address Number * }
5. { Address Number Prefix } + { Separator Element } + { Address Number * }
6. { Address Number Prefix } + { Address Number * } + { Address Number Suffix }
7. { Address Number Prefix } + { Separator Element } + { Address Number * } + { Address Number Suffix }
8. { Address Number Prefix } + { Address Number * } + { Separator Element } + { Address Number Suffix }
9. { Address Number Prefix } + { Separator Element } + { Address Number * } + { Separator Element } + { Address Number Suffix }

Place State ZIP is Shown in Parsed Form. In each class syntax pattern, the Complete Place Name, State Name, Zip Code, Zip Plus 4, and Country Name. are shown separately. They could also be shown in their unparsed form as the Place State ZIP

element. However, the elements are shown separately in each syntax pattern, to emphasize the importance of each separate element in the address.

XML Notation and Formatting. XML models and examples conform to the W3 C XML Core Working Group's "Extensible Markup Language (XML) 1.0" (see Appendix A for a complete citation).

3.2 Address Classes

3.2.1 Thoroughfare Classes

A thoroughfare address specifies a location by reference to a thoroughfare. A thoroughfare in this context is a road or other access route by which the addressed feature can be reached (definition adapted from Universal Postal Union, "*International Postal Address Components and Templates*", Publication S42-4 (approved July 6, 2004), section 5.2.9). A thoroughfare is typically but not always a road — it may be, for example, a walkway, a railroad, or a river. In most but not all addresses the thoroughfare is designated by a Complete Street Name and sites or features along the thoroughfare are designated in sequence by their Complete Address Number.

3.2.1.1 Numbered Thoroughfare Address

Syntax: { Complete Landmark Name or Complete Place Name } + { Complete Address Number * } + { Complete Street Name * } + { Complete Subaddress } + { Complete Place Name * } + { State Name * } + { Zip Code } + { Zip Plus 4 } + { Country Name }

Defining Characteristics:

1. Addresses of this class must include a Complete Address Number and a Complete Street Name.
2. In addition, all thoroughfare, landmark, and postal addresses must include a Place Name and a State Name. A Zip Code is recommended but not mandatory.

Examples:

- 123 Main Street Buffalo Lake MN 55314
- 123 Main Street Apt 3A Buffalo Lake MN 55314
- 123 North Main Street Le Sueur MN 56058
- 123A North Main Street Le Sueur MN 56058
- 123 South Avenue C Cheyenne WY 82007
- A123 Calle B Ponce PR 00716-2525
- 123 Boulevard of the Allies Pittsburgh PA 15222-1613
- 123 Camino de la Placitas Taos NM 87571
- 210 East 400 South, Salt Lake City, UT 84111

- Mile Post 142.5, Sterling Highway, Happy Valley, AK 99639
- White House, 1600 Pennsylvania Avenue, Washington DC 20500
- Heinz Hall, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh PA 15217
- Standard Office Building, Suite 400, 600 North Milwaukee Street, Milwaukee, WI 53202
- Urbanizacion Las Gladiolas, 150 Calle A, San Juan PR 00926-3232
- Carver Park Estates, 2730 Unwin Road, Cleveland, OH 44104

Notes:

1. Most business and residential addresses are Numbered Thoroughfare Addresses.
2. Numbered Thoroughfare Addresses are sometimes preceded by Complete Landmark Names. For example:
 - White House, 1600 Pennsylvania Avenue, Washington DC 20500
 - Heinz Hall, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh PA 15217
 - Standard Office Building, Suite 400, 600 North Milwaukee Street, Milwaukee, WI 53202
3. Less commonly, Numbered Thoroughfare Addresses are preceded by Complete Place Names, such as, for example, the name of a neighborhood, housing project, or Puerto Rican urbanizacion. When a Complete Place Name is used in this syntax, it must have a Place Name Type of Community:
 - Urbanizacion Las Gladiolas, 150 Calle A, San Juan PR 00926-3232
 - Carver Park Estates, 2730 Unwin Road, Cleveland, OH 44104
4. Strictly speaking, these are hybrid addresses. Logically they can each be decomposed to two related addresses, a Numbered Thoroughfare Address, and a Landmark Address or Community Address. For that reason, the Complete Landmark Name and Complete Place Name (where Place Name Type = "Community"), although permitted, are not shown in the syntax of the Numbered Thoroughfare Address.
5. If the Complete Address Number is missing, then either the address is incomplete, or the address should be classified as an Unnumbered Thoroughfare Address.
6. In Puerto Rico it is common practice to name subdivisions and neighborhoods ("urbanizaciones"), number the streets within them (Calle 1, Calle 2, etc.), and assign Complete Address Numbers that duplicate Complete Address Numbers in other nearby urbanizaciones. As a result a jurisdiction or postal delivery area may contain duplicate Complete Street Names and address ranges. In these cases the urbanizacion name is required to tell the duplicates apart:
 - Urbanizacion Royal Oak, 123 Calle 1, Bayamon PR 00961-0123

- Urbanizacion Hermosillo, 123 Calle 1, Bayamon PR 00961-1212
7. Some Puerto Rican urbanizacion addresses include Complete Street Names, and some do not. Urbanizacion addresses are classified as Numbered Thoroughfare Addresses if they include a thoroughfare name. Without a thoroughfare name, they are classified as Community Addresses:
- (Numbered Thoroughfare Address): Urbanizacion Royal Oak, 123 Calle 1, Bayamon PR 00961-0123
 - (Community Address): 1234 Urbanizacion Los Olmos, Ponce PR 00731
8. For additional information on Puerto Rican addressing see USPS “Addressing Standards for Puerto Rico and the Virgin Islands” (p. 1-6), and also USPS Publication 28, Section 29.

XML Tag:

```
<  
NumberedThoroughfareAddress  
>
```

XML Model:

```
<xsd:complexType name="NumberedThoroughfareAddress_type">  
    <xsd:sequence>  
        <xsd:choice>  
            <xsd:element name="CompleteLandmarkName"  
                type="addr_type:CompleteLandmarkName_type"  
                minOccurs="0"  
                maxOccurs="1" />  
            <xsd:element name="CompletePlaceName"  
                type="addr_type:CompletePlaceName_type"  
                minOccurs="0"  
                maxOccurs="1" />  
        </xsd:choice>  
        <xsd:element name="CompleteAddressNumber"  
            type="addr_type:CompleteAddressNumber_type"  
            minOccurs="1"  
            maxOccurs="1" />  
        <xsd:element name="CompleteStreetName"  
            type="addr_type:CompleteStreetName_type" minOccurs="1"  
            maxOccurs="1" />  
        <xsd:element name="CompleteSubaddress"  
            type="addr_type:CompleteSubaddress_type" minOccurs="0"  
            maxOccurs="1" />  
        <xsd:group ref="addr_type:PlaceStateZip_group"  
            minOccurs="0"  
            maxOccurs="unbounded" />  
        <xsd:group ref="addr_type:AddressAttributes_group"  
            minOccurs="0" maxOccurs="1" />  
    </xsd:sequence>  
    <xsd:attribute name="action" type="addr_type:Action_type"  
        use="optional" />  
</xsd:complexType>
```

XML Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4.2" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="addr addr.xsd ">
  <NumberedThoroughfareAddress>
    <CompleteAddressNumber>
      <AddressNumber>123</AddressNumber>
    </CompleteAddressNumber>
    <CompleteStreetName>
      <StreetName>Main</StreetName>
      <StreetNamePostType>Street</StreetNamePostType>
    </CompleteStreetName>
    <CompletePlaceName>
      <PlaceName>Buffalo Lake</PlaceName>
    </CompletePlaceName>
    <StateName>MN</StateName>
    <ZipCode>55314</ZipCode>
  </NumberedThoroughfareAddress>
</addr:AddressCollection>
```

Quality Measures:

- Address Completeness Measure
- Address Number Fishbones Measure
- Address Left Right Measure
- Pattern Sequence Measure
- Range Domain Measure
- Spatial Domain Measure

3.2.1.2 Intersection Address

Syntax: :{ Complete Landmark Name or Complete Place Name } + { Corner Of } + { Complete Street Name * { Separator Element * } } (2..n) + { Complete Place Name * } + { State Name * } + { Zip Code } + { Zip Plus 4 } + { Country Name }

Defining Characteristics:

1. An address of this class must include two or more Complete Street Names, each separated by a Separator Element.
2. In addition, all thoroughfare, landmark, and postal addresses must include a Place Name and a State Name. A Zip Code is recommended but not mandatory.

Examples:

- Boardwalk and Park Place, Atlantic City, NJ
- Hollywood Boulevard and Vine Street, Hollywood, CA
- West Street & Main Street, Newtown, CT
- P Street && 19th Street && Mill Road, Ellicott City, MD
- Avenida Rosa y Calle 19, Bayamon PR
- Memorial Park, Last Chance Gulch and Memorial Drive, Helena, MT
- Phoenix Village, Scovill Avenue and East 59th Street, Cleveland, Ohio
- Northwest corner of Hollywood Boulevard and Vine Street, Hollywood, CA
- Freeway Park, north corner of Spring Street and Sixth Avenue, Seattle, WA

Notes:

1. Intersection addresses are useful for recording events occurring in the street, such as accidents, infrastructure locations, etc. However, when referring to a feature on one corner of an intersection, the Numbered Thoroughfare Address for that corner is always preferable to the intersection address.
2. A Complete Landmark Name or Complete Place Name may precede an Intersection Address. Where a Complete Place Name is used it must have a Place Name Type of "Community". Strictly speaking, these are hybrid addresses. Logically they can each be decomposed to two related addresses, an Intersection Address, and a Landmark Address or Community Address. Examples:
 - Memorial Park, Last Chance Gulch and Memorial Drive, Helena, MT 59601
 - Phoenix Village, Scovill Avenue and East 59th Street, Cleveland, Ohio 44104
3. The Complete Street Names of an Intersection Address may be written in any order. A complete list of intersections should include multiple listings for each intersection, one with each name first (for example, both "State Street and Main Street", and "Main Street and State Street"). Intersections of more than two streets can be represented as one sequence of three or more street names, or as every pairwise combination of the names.
4. An intersection corner address can include only two Complete Street Names, and it must include a Corner Of element that specifies a particular corner of the intersection. Examples:
 - Northwest corner of Hollywood Boulevard and Vine Street, Hollywood, CA
 - Freeway Park, north corner of Spring Street and Sixth Avenue, Seattle, WA

-
5. Separator values include " and ", " at ", " @ ", " & ", and " && " "+","-", and " y " or " con " (Spanish) each having a space before and after. Other values may also be in use.
 6. Some address parsing software permits the use of ampersands (" & " or " && ") to signify intersection addresses, because the double ampersand does not occur in any street names, and ampersands rarely do. Be wary, though--in many programming languages, ampersands are reserved for other uses, which could complicate data exchange.
-

XML Tag:

```
<  
IntersectionAddress  
>
```

XML Model:

```
<xsd:complexType name="IntersectionAddress_type">  
  <xsd:sequence>  
    <xsd:choice>  
      <xsd:element name="CompleteLandmarkName"  
        type="addr_type:CompleteLandmarkName_type" minOccurs="0"  
        maxOccurs="1" />  
      <xsd:element name="CompletePlaceName"  
        type="addr_type:CompletePlaceName_type" minOccurs="0"  
        maxOccurs="1" />  
    </xsd:choice>  
    <xsd:element name="CornerOf" type="addr_type:CornerOf_type"  
    minOccurs="0"  
    maxOccurs="1"></xsd:element>  
    <xsd:element name="CompleteStreetName"  
      type="addr_type:CompleteStreetName_type" minOccurs="1"  
      maxOccurs="1" />  
    <xsd:group ref="addr:IntersectionAddress_StreetName_group"  
    minOccurs="1" maxOccurs="unbounded" />  
    <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"  
    maxOccurs="1" />  
    <xsd:group ref="addr_type:AddressAttributes_group"  
    minOccurs="0" maxOccurs="1" />  
  </xsd:sequence>  
  <xsd:attribute name="action" type="addr_type:Action_type"  
  use="optional" />  
</xsd:complexType>
```

XML Example:

```
<?xml version="1.0" encoding="UTF-8"?>  
<addr:AddressCollection version="0.4.2" xmlns:addr="addr"  
xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"  
xmlns:smil20="http://www.w3.org/2001/SMIL20/"  
xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"  
xmlns:xlink="http://www.w3.org/1999/xlink"
```

```
xmlns:xml="http://www.w3.org/XML/1998/namespace"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="addr addr.xsd >
<IntersectionAddress>
<CompleteStreetName>
<StreetName>Boardwalk</StreetName>
</CompleteStreetName>
<SeparatorElement>and</SeparatorElement>
<CompleteStreetName>
<StreetName>Park</StreetName>
<StreetNamePostType>Place</StreetNamePostType>
</CompleteStreetName>
<CompletePlaceName>
<PlaceName>Atlantic City</PlaceName>
</CompletePlaceName>
<StateName>NJ</StateName>
</IntersectionAddress>
</addr:AddressCollection>
```

Quality Measures

Intersection Validity Measure

Pattern Sequence Measure

Spatial Domain Measure

3.2.1.3 Two Number Address Range

Syntax: { Complete Landmark Name or Complete Place Name } + { Complete Address Number (low) * } + { Separator Element * } + { Complete Address Number (high)* } + { Complete Street Name * } + { Complete Place Name * } + { State Name * } + { Zip Code } + { Zip Plus 4 } + { Country Name }

Defining Characteristics:

1. Addresses of this class must include two Complete Address Numbers separated by a hyphen. The first Complete Address Number must be less than or equal to the second.
2. The two Complete Address Numbers must be followed by a Complete Street Name.
3. In addition, all thoroughfare, landmark, and postal addresses must include a Place Name and a State Name. A Zip Code is recommended but not mandatory.

Examples:

- 401-418 Green Street, Flint MI 48503
- 1400-1420 Smith Street, West Monroe, LA 71292
- 13-25 Elm Street, Muncie, IN 47305

- 214-02 - 214-14 1/2 Evergreen Street, New York, NY 11364
- 55A - 55H Kelly Circle SW, Bolling Air Force Base, Washington, DC
- Quincy Market, 1-47 Faneuil Hall Market Place, Boston, MA 02109

Notes:

1. The Two Number Address Range includes a set of two Complete Address Numbers, which represent the low and high values of a continuous series of Complete Address Numbers. By convention, the first Complete Address Number represents the low end of the range, and the second represents the high end, and they are separated by a hyphen.
2. Generally, but not always, if a range refers to Complete Address Numbers on one side of a thoroughfare, the Complete Address Numbers in the range will all have the same parity, that is, they will all be either odd or even. However, mixed parities do occur in some places.
3. A range can begin or end with a Complete Address Number that has a suffix or prefix. USPS Publication 28 Appendix E contains instructive notes on the complexities of these address ranges.
4. Use the Address Range Type to show whether a Two Number Address Range represents an actual or potential range.
5. Use the Address Range Parity attribute to show whether a Two Number Address Range includes Complete Address Numbers that are odd, even, or both.
6. If a Two Number Address Range is related to a transportation segment (or set of segments) in a transportation network model, then:
 - The Address Range Side attribute may be used to show if the Complete Address Numbers in the range are on the right side, left side, or both sides of the segment(s).
 - The Address Range Directionality attribute may be used to show if the Complete Address Numbers in the range increase with or against the directionality of the segment(s).
 - The Address Range Span attribute may be used to show whether the range spans a part of one segment, one entire segment, multiple segments, or the entire length of the thoroughfare.
7. Use the Address Transportation System Name, Address Transportation System Authority, Address Transportation Feature Type, Address Transportation Feature ID, and Related Transportation Feature ID attributes to relate a particular address range to a specific transportation segment (or set of segments) in a specific transportation network model. Transportation segments, and transportation network models generally, are defined and described in the FGDC's "Geographic Information Framework Data Content Standard Part 7: Transportation Base."

8. Ranges should not be confused with hyphenated address numbers that denote a single site. A range must be composed of two Complete Address Numbers. Certain areas of New York City, southern California, and Hawaii use hyphens in Complete Address Numbers. In the example above, "214-02 Evergreen St" would be one address, and "214-14 1/2 Evergreen Street" would be a second address, and neither one alone is an address range.
9. A Two Number Address Range may be preceded by a Complete Landmark Name or Complete Place Name that spans the range. (for example: "Quincy Market, 1-47 Faneuil Hall Market Place, Boston, MA 02109"). IF a Complete Place Name is used, it must have a Place Name Type of "Community". Strictly speaking, this is a hybrid address. Logically it could be decomposed to two related addresses, the Two Number Address Range, and a corresponding Landmark Address or Community Address. For that reason, the Complete Landmark Name and Complete Place Name, although permitted, are not shown in the syntax of the Two Number Address Range.

XML Tag:

```
<  
TwoNumberAddressRange  
>
```

XML Model:

```
<xsd:complexType name="TwoNumberAddressRange_type">  
  <xsd:sequence>  
    <xsd:choice>  
      <xsd:element name="CompleteLandmarkName"  
        type="addr_type:CompleteLandmarkName_type" minOccurs="0"  
        maxOccurs="1" />  
      <xsd:element name="CompletePlaceName"  
        type="addr_type:CompletePlaceName_type" minOccurs="0"  
        maxOccurs="1" />  
    </xsd:choice>  
    <xsd:element name="CompleteAddressNumber"  
      type="addr_type:CompleteAddressNumber_type" minOccurs="1"  
      maxOccurs="1" />  
    <xsd:element name="SeparatorElement"  
      type="addr_type:Separator_type" maxOccurs="1" minOccurs="1"  
    />  
    <xsd:element name="CompleteAddressNumber"  
      type="addr_type:CompleteAddressNumber_type" minOccurs="1"  
      maxOccurs="1" />  
    <xsd:element name="CompleteStreetName"  
      type="addr_type:CompleteStreetName_type" minOccurs="1"  
      maxOccurs="1" />  
    <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"  
      maxOccurs="unbounded" />  
    <xsd:group ref="addr_type:AddressAttributes_group"  
      minOccurs="0" maxOccurs="1" />  
  </xsd:sequence>  
  <xsd:attribute name="action" type="addr_type:Action_type"  
    use="optional" />
```

```
</xsd:complexType>
```

XML Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4.2" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="addr addr.xsd ">
  <TwoNumberAddressRange>
    <CompleteAddressNumber>
      <AddressNumber>401</AddressNumber>
    </CompleteAddressNumber>
    <SeparatorElement>-</SeparatorElement>
    <CompleteAddressNumber>
      <AddressNumber>418</AddressNumber>
    </CompleteAddressNumber>
    <CompleteStreetName>
      <StreetName>Green</StreetName>
      <StreetNamePostType>Street</StreetNamePostType>
    </CompleteStreetName>
    <CompletePlaceName>
      <PlaceName>Flint</PlaceName>
    </CompletePlaceName>
    <StateName>MI</StateName>
    <ZipCode>48503</ZipCode>
  </TwoNumberAddressRange>
</addr:AddressCollection>
```

Quality Measures

- Address Number Fishbones Measure
- Address Number Range Completeness Measure
- Address Number Range Parity Consistency Measure
- Low High Address Sequence Measure
- Overlapping Ranges Measure
- Pattern Sequence Measure
- Range Domain Measure
- SpatialDomainMeasure

3.2.1.4 Four Number Address Range

Syntax: { Complete Landmark Name or Complete Place Name } + { Complete Address Number *(left low) } + { Complete Address Number *(left high) } + { Complete Address Number * (right low) } + { Complete Address Number * (right high) }

**high) }+{ Complete Street Name * } + { Complete Place Name * } + { State Name * }
+ { Zip Code } + { Zip Plus 4 } + { Country Name }**

Defining Characteristics:

1. Addresses of this class must include four Complete Address Numbers, representing respectively the left low, left high, right low, and right high four Complete Address Numbers for the block or transportation segment(s), followed by a Complete Street Name.
2. In addition, all thoroughfare, landmark, and postal addresses must include a Place Name and a State Name. A Zip Code is recommended but not mandatory.
3. The Four Number Address Range syntax follows the structure established by the U.S. Census Bureau for TIGER/Line file street segment address ranges (see <http://www.census.gov/geo/www/tiger/tgrshp2008/TGRSHP08.pdf> ("All Lines Shapefile" attribute table layout)).

Examples:

- U.S. Census Bureau TIGER file formatted address ranges (left low, left high, right low, right high, street name) are the most widely-used examples of Four Number Address Ranges.

Notes:

1. Address ranges are important for municipal operations (such as snow plow dispatch), emergency dispatch, and geocoding.
2. A Four Number Address Range includes four Complete Address Numbers, representing, for each side of a block or transportation segment, the low and high end of the Complete Address Number range. By convention, based on the attribute structure established by the U.S. Census Bureau for the TIGER/Line files, the left-side low Complete Address Number is given first, followed by the left-side high Complete Address Number, followed by the right-side low and high Complete Address Numbers.
3. Generally, but not always, the left and right ranges will have different parities (even or odd). However, mixed parities do occur in some places.
4. A range can begin or end with a Complete Address Number that has a suffix or prefix. USPS Publication 28 Appendix E contains instructive notes on the complexities of these address ranges.
5. Use the Address Range Type attribute to show whether a Four Number Address Range represents an actual or potential range.
6. Use the Address Range Parity attribute to show whether Four Number Address Ranges include Complete Address Numbers that are odd, even, or both.
7. Each Four Number Address Range has two Address Range Parity values, one for the left range and one for the right range. The parity of the left range is determined by the Address Number Parity of first two Complete Address

Numbers (left low and left high). The parity of the right range is determined by the Address Number Parity of third and fourth Complete Address Numbers (right low and right high).

8. If a Four Number Address Range is related to a transportation segment (or set of segments) in a transportation network model, , then:
 - o The Address Range Side attribute may be used to show if the Complete Address Numbers in the range are on the right side, left side, or both sides of the segment(s).
 - o The Address Range Directionality attribute may be used to show if the Complete Address Numbers in the range increase with or against the directionality of the segment(s).
 - o The Address Range Span attribute may be used to show whether the range spans a part of one segment, one entire segment, multiple segments, or the entire length of the thoroughfare.
9. Use the Address Transportation System Name, Address Transportation System Authority, Address Transportation Feature Type, Address Transportation Feature ID, and Related Transportation Feature ID attributes to relate a particular address range to a specific transportation segment (or set of segments) in a specific transportation network model. Transportation segments, and transportation network models generally, are defined and described in the FGDC's "Geographic Information Framework Data Content Standard Part 7: Transportation Base."
10. By definition, milepost Complete Address Numbers cannot be used in composing Four Number Address Ranges. Milepost Complete Address Numbers denote distance only, not side of street or parity. Therefore milepost Complete Address Numbers can be used only in Two Number Address Ranges (e.g. Milepost 21 - Milepost 24).
11. A Four Number Address Range may be preceded by a Complete Landmark Name or Complete Place Name that encompasses the range. If a Complete Place Name is used, it must have a Place Name Type of "Community." Strictly speaking, this would be a hybrid address. Logically it could be decomposed to two related addresses, the Four Number Address Range, and a corresponding Landmark Address or Community Address. For that reason, the Complete Landmark Name and Complete Place Name, although permitted, are not shown in the syntax of the Four Number Address Range.

XML Tag:

```
<  
FourNumberAddressRange  
>
```

XML Model:

```
<xsd:complexType name="FourNumberAddressRange_type">
```

```
<xsd:annotation>
  <xsd:documentation>
  </xsd:documentation>
</xsd:annotation>
<xsd:sequence>
  <xsd:choice>
    <xsd:element name="CompleteLandmarkName"
      type="addr_type:CompleteLandmarkName_type"
      minOccurs="0"
      maxOccurs="1" />
    <xsd:element name="CompletePlaceName"
      type="addr_type:CompletePlaceName_type"
      minOccurs="0"
      maxOccurs="1" />
  </xsd:choice>
  <xsd:element name="CompleteAddressNumber"
    type="addr_type:CompleteAddressNumber_type"
    minOccurs="1"
    maxOccurs="1" />
  <xsd:element name="SeparatorElement"
    type="addr_type:Separator_type" maxOccurs="1"
    minOccurs="1" />
    <xsd:element name="CompleteAddressNumber"
      type="addr_type:CompleteAddressNumber_type"
      minOccurs="1"
      maxOccurs="1" />
    <xsd:element name="SeparatorElement"
      type="addr_type:Separator_type" maxOccurs="1"
      minOccurs="1" />
    <xsd:element name="CompleteAddressNumber"
      type="addr_type:CompleteAddressNumber_type"
      minOccurs="1"
      maxOccurs="1" />
    <xsd:group ref="addr_type:PlaceStateZip_group"
      minOccurs="1"
      maxOccurs="1" />
    <xsd:group ref="addr_type:AddressAttributes_group"
      minOccurs="0" maxOccurs="1" />
  </xsd:sequence>
  <xsd:attribute name="action" type="addr_type:Action_type"
    use="optional" />
</xsd:complexType>
```

XML Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4.2" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml">
```

```
xmlns:smil20="http://www.w3.org/2001/SMIL20/"
xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xml="http://www.w3.org/XML/1998/namespace"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="addr addr.xsd "
<FourNumberAddressRange>
  <CompleteAddressNumber>
    <AddressNumber>1900</AddressNumber>
  </CompleteAddressNumber>
  <SeparatorElement>-</SeparatorElement>
  <CompleteAddressNumber>
    <AddressNumber>1908</AddressNumber>
  </CompleteAddressNumber>
  <CompleteAddressNumber>
    <AddressNumber>1901</AddressNumber>
  </CompleteAddressNumber>
  <SeparatorElement>-</SeparatorElement>
  <CompleteAddressNumber>
    <AddressNumber>1909</AddressNumber>
  </CompleteAddressNumber>
  <CompleteStreetName>
    <StreetName>Bear</StreetName>
    <StreetNamePostType>court</StreetNamePostType>
  </CompleteStreetName>
  <CompletePlaceName>
    <PlaceName>Fort Collins</PlaceName>
  </CompletePlaceName>
  <StateName>CO</StateName>
  <ZipCode>80525</ZipCode>
</FourNumberAddressRange>
</addr:AddressCollection>
```

Quality Measures

- Address Number Fishbones Measure
- Address Number Range Completeness Measure
- Address Number Range Parity Consistency Measure
- Overlapping Ranges Measure
- Left Right Odd Even Parity Measure
- Low High Address Sequence Measure
- OverlappingRangesMeasure
- Pattern Sequence Measure
- Range Domain Measure
- Spatial Domain Measure

3.2.1.5 Unnumbered Thoroughfare Address

Syntax: { Complete Landmark Name or Complete Place Name } + { Complete Street Name * } + { Complete Subaddress } + { Complete Place Name * } + { State Name * } + { Zip Code } + { Zip Plus 4 } + { Country Name }

Defining Characteristics:

1. Addresses of this class must contain a Complete Street Name with no Complete Address Number preceding it.
2. In addition, all thoroughfare, landmark, and postal addresses must include a Place Name and a State Name. A Zip Code is recommended but not mandatory.

Example:

- Ili'ili Airport Road, Ili'ili, AS
- East End Road, St. Croix, VI 00820
- Ilisagvik College, Stevenson Street, Barrow, AK 99723
- Orote Point Lighthouse, San Luis Drive, Santa Rita, GU

Notes:

1. In many areas no address numbers have been assigned, and addresses in those areas often include only the thoroughfare name. This class separates those addresses from addresses that include address numbers or cross-streets.
2. An Unnumbered Thoroughfare Address may be preceded by a Complete Landmark Name or Complete Place Name (for example, "Ilisagvik College, Stevenson Street, Barrow, AK 99723"). If a Complete Place Name is used, it must have the Place Name Type of "Community". Strictly speaking, this would be a hybrid address. Logically it can be decomposed to two related addresses, the Unnumbered Thoroughfare Address, and a corresponding Landmark Address or Community Address. For that reason, the Complete Landmark Name and Complete Place Name, although permitted, are not shown in the syntax of the Unnumbered Thoroughfare Address.

XML Tag:

```
<  
UnnumberedThoroughfareAddress  
>
```

XML Model:

```
<xsd:complexType name="UnnumberedThoroughfareAddress_type">  
  <xsd:annotation>  
    <xsd:documentation xml:lang="en">  
      </xsd:documentation>
```

```
</xsd:annotation>
<xsd:sequence>
  <xsd:choice>
    <xsd:element name="CompleteLandmarkName"
      type="addr_type:CompleteLandmarkName_type" minOccurs="0"
      maxOccurs="1" />
    <xsd:element name="CompletePlaceName"
      type="addr_type:CompletePlaceName_type" minOccurs="0"
      maxOccurs="1" />
  </xsd:choice>
  <xsd:element name="CompleteStreetName"
    type="addr_type:CompleteStreetName_type" minOccurs="1"
    maxOccurs="1" />
  <xsd:element name="CompleteSubaddress"
    type="addr_type:CompleteSubaddress_type" minOccurs="0"
    maxOccurs="1" />
  <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"
    maxOccurs="1" />
  <xsd:group ref="addr_type:AddressAttributes_group"
    minOccurs="0" maxOccurs="1" />
</xsd:sequence>
<xsd:attribute name="action" type="addr_type:Action_type"
  use="optional" />
</xsd:complexType>
```

XML Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4.2" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="addr addr.xsd ">
  <UnnumberedThoroughfareAddress>
    <CompleteStreetName>
      <StreetName>Fagaima</StreetName>
      <StreetNamePostType>Road</StreetNamePostType>
    </CompleteStreetName>
    <CompletePlaceName>
      <PlaceName>Nu'uli</PlaceName>
    </CompletePlaceName>
    <StateName>AS</StateName>
    <ZipCode>96799</ZipCode>
  </UnnumberedThoroughfareAddress>
</addr:AddressCollection>
```

Quality Measures

Address Number Fishbones Measure

Pattern Sequence Measure

Spatial Domain Measure

Quality Notes

Although this address class has no street number, the Address Number Fishbones Measure can be run without reference to ranges or address number, simply drawing fishbones to the closest point on the street.

3.2.2 Landmark Classes

A landmark address specifies a location by reference to a named landmark. A landmark is a relatively permanent feature of the manmade landscape that has recognizable identity within a particular cultural context (definition adapted from U.S. Board on Geographic Names, "Principles, Policies, Procedures," (Online Edition (revised)), 2003, p. 48, definition of "geographic name").

3.2.2.1 Landmark Address

Syntax: { Complete Landmark Name * } (1..n) + { Complete Subaddress } + { Complete Place Name * } + { State Name * } + { Zip Code } + { Zip Plus 4 } + { Country Name }

Defining Characteristics:

1. Addresses of this class must include a Complete Landmark Name, with no Complete Address Number preceding it and no Complete Street Name following it.
2. In addition, all thoroughfare, landmark, and postal addresses must include a Place Name and a State Name. A Zip Code is recommended but not mandatory.

Examples:

- Statue of Liberty, New York NY 10004
- Langston Housing Complex, Building 7, Apartment 290, Kansas City KS 66101
- Condominium Garden Hills Plaza, Torre 2, Apartamento 905, Mayaguez PR 00680-1233
- Condominium Del Mar, Apartamento 905, Ponce PR 00731
- Residencial Las Margaritas, Edificio 1, Apartamento 104, San Juan PR 00924

Notes:

1. This class includes the "condominium" addresses found in Puerto Rico, where a complex or building is known by name, without reference to a street.

XML Tag:

```
<  
LandmarkAddress  
>
```

XML Model:

```
<xsd:complexType name="LandmarkAddress_type">
  <xsd:sequence>
    <xsd:element name="CompleteLandmarkName"
      type="addr_type:CompleteLandmarkName_type"
      minOccurs="1" maxOccurs="1" />
    <xsd:element name="CompleteSubaddress"
      type="addr_type:CompleteSubaddress_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"
      maxOccurs="1" />
    <xsd:group ref="addr_type:AddressAttributes_group"
      minOccurs="0" maxOccurs="1" />
  </xsd:sequence>
  <xsd:attribute name="action" type="addr_type:Action_type"
    use="optional" />
</xsd:complexType>
```

XML Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4.2" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="addr addr.xsd ">
  <LandmarkAddress>
    <CompleteLandmarkName>
      <LandmarkName>Condominium Garden Hills Plaza</LandmarkName>
    </CompleteLandmarkName>
    <CompleteSubaddress>
      <SubaddressElement SubaddressComponentOrder="1">
        <SubaddressType>Torre</SubaddressType>
        <SubaddressIdentifier>2</SubaddressIdentifier>
      </SubaddressElement>
      <SubaddressElement>
        <SubaddressType>Apartamento</SubaddressType>
        <SubaddressIdentifier>905</SubaddressIdentifier>
      </SubaddressElement>
    </CompleteSubaddress>
    <CompletePlaceName>
      <PlaceName>Mayaguez</PlaceName>
    </CompletePlaceName>
    <StateName>PR</StateName>
    <ZipCode>00608</ZipCode>
    <ZipPlus4>1233</ZipPlus4>
  </LandmarkAddress>
</addr:AddressCollection>
```

Quality Measures

Pattern Sequence Measure

Spatial Domain Measure

3.2.2.2 Community Address

Syntax: { Complete Address Number * } + { Complete Landmark Name or Complete Place Name * } + { Complete Subaddress } + { Complete Place Name * } + { State Name * } + { Zip Code } + { Zip Plus 4 } + { Country Name }

Defining Characteristics:

1. Addresses of this class must include a Complete Address Number followed by a Complete Landmark Name or a Complete Place Name, and they must not include a Complete Street Name.
2. In addition, all thoroughfare, landmark, and postal addresses must include a Place Name and a State Name. A Zip Code is recommended but not mandatory.

Examples:

- 1234 Urbanizacion Los Olmos, Ponce PR 00731
- A17 Jardine Fagota, Ponce PR 00731
- B133 Urbanizacion Golden Gate, San Juan PR 00920
- 23B Edgewater Park, Apartment 12, Bronx, NY 10465

Notes:

1. Community Addresses may be found in gated communities, housing projects, Puerto Rican urbanizations, trailer courts, and similar developments that are built around interior walkways or roadways. Their Complete Address Numbers refer to the community name, not to a thoroughfare. The community name might be a treated as a Landmark Name or Place Name--the distinction is often arbitrary or unclear for community names.
2. If there is no Complete Address Number preceding the urbanization name, the address fits into the Landmark Address class.
3. If the address includes both a Complete Street Name and a community name, it fits in the Numbered Thoroughfare Address class.
4. This class includes Puerto Rican urbanization addresses where the urbanization name is preceded by a number, and no street name is included. In Puerto Rico, an urbanization denotes an area, sector, or residential development within a geographic area. For more information on Puerto Rican addressing conventions, see USPS Publication 28 Section 29, and USPS “Addressing Standards for Puerto

Rico and the Virgin Islands". See also the notes under Numbered Thoroughfare Address.

XML Tag:

```
<  
CommunityAddress  
>
```

XML Model:

```
<xsd:complexType name="CommunityAddress_type">  
  <xsd:annotation>  
    <xsd:documentation> 1. Community Addresses are commonly used for  
    housing projects, Puerto Rican urbanizations, trailer courts, and  
    similar developments that are built around unnamed interior walkways  
    or roadways. Their Complete Address Numbers refer to the community  
    name, not to a thoroughfare. 2. A Community Address includes a  
    Complete Address Number, a community name, and a Place Name. The  
    address does not include a Complete Street Name. The community name  
    might be a treated as a Landmark Name or Place Name--the distinction  
    is often arbitrary or unclear for community names. 3. If there is no  
    Complete Address Number preceding the urbanization name, the address  
    fits into the Landmark Address class. 4. If the address includes  
    both a Complete Street Name and a community name, it fits in the  
    Landmark Site Address class. 5. This class includes Puerto Rican  
    urbanization addresses where the urbanization name is preceded by a  
    number, and no street name is included. In Puerto Rico, an  
    urbanization denotes an area, sector, or residential development  
    within a geographic area. For more information on Puerto Rican  
    addressing conventions, see USPS Publication 28 Section 29, and USPS  
    "Addressing Standards for Puerto Rico and the Virgin Islands".  
    </xsd:documentation>  
  </xsd:annotation>  
  <xsd:sequence>  
    <xsd:element name="CompleteAddressNumber"  
      type="addr_type:CompleteAddressNumber_type"  
      minOccurs="1" maxOccurs="1" />  
    <xsd:choice>  
      <xsd:element name="CompleteLandmarkName"  
        type="addr_type:CompleteLandmarkName_type"  
        minOccurs="1" maxOccurs="1" />  
      <xsd:element name="CompletePlaceName"  
        type="addr_type:CompletePlaceName_type"  
        minOccurs="1" maxOccurs="1" />  
    </xsd:choice>  
    <xsd:element name="CompleteSubaddress"  
      type="addr_type:CompleteSubaddress_type"  
      minOccurs="0" maxOccurs="1" />  
    <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"  
      maxOccurs="1" />  
    <xsd:group ref="addr_type:AddressAttributes_group"  
      minOccurs="0" maxOccurs="1" />  
  </xsd:sequence>  
  <xsd:attribute name="action" type="addr_type:Action_type"  
    use="optional" />
```

```
</xsd:complexType>
```

XML Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4.2" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="addr addr.xsd ">
  <CommunityAddress>
    <CompleteAddressNumber>
      <AddressNumberPrefix>A</AddressNumberPrefix>
      <AddressNumber>17</AddressNumber>
    </CompleteAddressNumber>
    <CompleteLandmarkName>
      <LandmarkName>Jardine Fagota</LandmarkName>
    </CompleteLandmarkName>
    <CompletePlaceName>
      <PlaceName>Ponce</PlaceName>
    </CompletePlaceName>
    <StateName>PR</StateName>
    <ZipCode>00731</ZipCode>
  </CommunityAddress>
</addr:AddressCollection>
```

Quality Measures

Pattern Sequence Measure

Spatial Domain Measure

3.2.3 Postal Delivery Classes

A postal delivery address specifies a point of postal delivery that has no definite relation to the location of the recipient, such as a post office box, rural route box, overseas military address, or general delivery office. The USPS specifies each class in detail in USPS Publication 28.

Postal addresses are often combined with thoroughfare and landmark addresses.

Examples:

- Landmark-Postal Address: Wagon Wheel Ranch, RR1 Box 100, Pawhuska, OK
- Postal-Thoroughfare Address: 200 South Minnesota Avenue, PO Box 1304, Sioux Falls, SD
- Landmark-Postal-Thoroughfare Address: Twin Falls Extension Center, Evergreen Building, College of Southern Idaho, PO Box 1827, 315 Falls Avenue East, Twin Falls, ID

These potential classes are not recognized in this standard because the USPS strongly discourages their use (USPS Publication 28 sections 215, 245, 255, 295.6 and 295.7). Within the standard they can be handled in two ways:

1. Separate them into their component types, create records for each, and relate the records to show that they refer to the same location.
2. Treat the entire address as a General Address Class address.

3.2.3.1 USPSPostal Delivery Box

Syntax: { USPS Box* } + { Complete Subaddress } + { Complete Place Name * } + { State Name * } + { Zip Code } + { Zip Plus 4 } + { Country Name }

USPS Box Format: USPS Box = "PO Box" + { USPSBox ID * }

In this address class, the phrase "PO Box" is the only permitted value for USPSBox Type.

Defining Characteristics:

1. Addresses of this class must include a USPS Box in the required format, and must not include a USPS Route.
2. In addition, all thoroughfare, landmark, and postal addresses must include a Place Name and a State Name. A Zip Code is recommended but not mandatory.

Example:

- PO BOX 16943, New Orleans LA 70112
- PO BOX 1890, Kryton TN 38188-1890
- PO BOX G, Gabbs NV 89409
- PO BOX 159753 PMB 3571, Herndon VA 22071-2716

Notes:

1. This class is defined in USPS Publication 28, Sections 281-283. The phrase "PO Box" is mandatory as the USPS Box Type.
2. USPS Pub 28 Sec. 282: "Post Office Box numbers that are preceded by significant leading zeroes are identified in the ZIP+4 File by a hyphen (-) preceding the box number. Convert the hyphen into a zero on the output mailpiece.
 - ZIP+4 File: PO BOX -0145
 - Mailpiece: PO BOX 00145"

3. USPS Pub 28 Sec. 283: "PO Box addresses often appear with the word CALLER, FIRM CALLER, BIN, LOCKBOX, or DRAWER. Change these to PO BOX."
 - o Incorrect: DRAWER L
 - o Correct: PO BOX L
3. The Complete Subaddress, if it appears at all, must have only one Subaddress Element, and that Subaddress Element must have a Subaddress Type of "PMB".
4. In USPSPostal Delivery Box addresses, the Complete Place Name element may include multiple Place Names, but the USPS strongly prefers that only the postal community name be used. Example:
 - o **Preferred:** Wailuku, HI
 - o **Acceptable:** Wailuku, Maui, HI

XML Tag:

```
<  
USPSPostalDeliveryBox  
>
```

XML Model:

```
<xsd:complexType name="USPSPostalDeliveryBox_type">  
  <xsd:sequence>  
    <xsd:element name="USPSBox" type="addr_type:USPSBox_type"  
      minOccurs="1" maxOccurs="1" />  
    <xsd:element name="CompleteSubaddress"  
      type="addr_type:CompleteSubaddress_type"  
      minOccurs="0" maxOccurs="1" />  
    <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"  
      maxOccurs="1" />  
    <xsd:group ref="addr_type:AddressAttributes_group"  
      minOccurs="0" maxOccurs="1" />  
  </xsd:sequence>  
  <xsd:attribute name="action" type="addr_type:Action_type"  
    use="optional" />  
</xsd:complexType>
```

XML Example:

```
<?xml version="1.0" encoding="UTF-8"?>  
  <addr:AddressCollection version="0.4.2" xmlns:addr="addr"  
    xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"  
    xmlns:smil20="http://www.w3.org/2001/SMIL20/"  
    xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"  
    xmlns:xlink="http://www.w3.org/1999/xlink"  
    xmlns:xml="http://www.w3.org/XML/1998/namespace"  
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"  
    xsi:schemaLocation="addr addr.xsd ">  
    <USPSPostalDeliveryBox>  
      <USPSBox>  
        <USPSBoxType>PO BOX</USPSBoxType>  
        <USPSBoxId>159753</USPSBoxId>
```

```
</USPSBox>
<CompleteSubaddress>
  <SubaddressElement>
    <SubaddressType>PMB</SubaddressType>
    <SubaddressIdentifier>3571</SubaddressIdentifier>
  </SubaddressElement>
</CompleteSubaddress>
<CompletePlaceName>
  <PlaceName>Herndon</PlaceName>
</CompletePlaceName>
<StateName>VA</StateName>
<ZipCode>22071</ZipCode>
</USPSPostalDeliveryBox>
</addr:AddressCollection>
```

Quality Measure

Pattern Sequence Measure

3.2.3.2 USPSPostal Delivery Route

Syntax: { USPS Address * } + { Complete Place Name * } + { State Name * } + { Zip Code } + { Zip Plus 4 } + { Country Name }

Type 1: Rural Route (RR):

USPS Address = "RR"* + { USPSBox Group ID * } + "BOX"* + { USPSBox ID * } + { Private Mail Box }

Syntax: { USPS Address* } + { Complete Place Name * } + { State Name * } + { Zip Code } + { Zip Plus 4 } + { Country Name }

Type 2: Highway Contract Route (HC):

USPS Address = "HC"* + { USPSBox Group ID * } + "BOX"* + { USPSBox ID * } + { Private Mail Box }

Syntax: { USPS Address* } + { Complete Place Name * } + { State Name * } + { Zip Code } + { Zip Plus 4 } + { Country Name }

Type 3: Overseas Military or Diplomatic Delivery:

USPS Address = "PSC" or "CMR" or "UNIT" * + { USPSBox Group ID * } + "BOX"* + { USPSBox ID * }

Syntax: { USPS Address* } + {"APO" or "FPO" or "DPO" *} + {"AE" or "AP" or "AA" *} + { Zip Code } + { Zip Plus 4 } + { Country Name }

Defining Characteristics:

1. Addresses of this class must include a USPS Address in the specified RR or HC or overseas military delivery format.
2. In addition, all thoroughfare, landmark, and postal addresses must include a Place Name and a State Name. A Zip Code is recommended but not mandatory.

Notes and Examples

General. In RR and HC addresses, the Complete Place Name element may include multiple Place Names, but the USPS recommends that only the postal community name be used. Example:

- Preferred: Wailuku, HI
- Acceptable: Wailuku, Maui, HI

Rural Route Address Notes and Examples (per USPS Pub 28 sec. 24):

- USPS Pub 28 Sec. 241: “Print rural route addresses on mailpieces as: RR N BOX NN. Do not use the words RURAL, NUMBER, NO., or the pound sign (#).”
 - RR 2 BOX 152
 - RR 9 BOX 23A
- USPS Pub 28 Sec. 242: “A leading zero before the rural route number is not necessary.”
 - Acceptable: RR03 BOX 98D
 - Preferred: RR 3 BOX 98D
- USPS Pub 28 Sec. 243: “Print hyphens as part of the box number only when they are part of the address in the ZIP+4 File.”
 - RR 4 BOX 19-1A
- USPS Pub 28 Sec. 244: “Change the designations RFD and RD (as a meaning for rural or rural free delivery) to RR.”
 - Incorrect: RFD ROUTE 4 #87A
 - Correct: RR 4 BOX 87A
- USPS Pub 28 Sec. 245: “There should be no additional designations, such as town or street names, on the Delivery Address Line of rural route addresses. Because street names used together with route and box numbers can create potential matching difficulty, mailers are encouraged to use only one style of addressing. If secondary name information is used, however, place it above the Delivery Address Line.”

- Incorrect: RR 2 BOX 18 BRYAN DAIRY RD
 - Correct: RR 2 BOX 18
- USPS Pub 28 Sec. 246: "When applying a ZIP+4 code to a rural address, an exact match is preferred. If a box number is included in the address, the mailpiece must bear the appropriate ZIP+4 code representing the range for that box number. When box number information is not available, the Rural Route base record must be used."
- Highway Contract Route Address Notes and Examples (per USPS Pub 28 sec. 25)**

 - USPS Pub 28 Sec. 251: "Print highway contract route addresses on a mailpiece as: HC N BOX NN. Do not use the words HIGHWAY CONTRACT, ROUTE, NUMBER, NO., STAR ROUTE, or the pound sign (#)."
 - Incorrect: HIGHWAY CONTRACT ROUTE 68 BOX 23A
 - Correct: HC 68 BOX 23A"
 - USPS Pub 28 Sec. 252: "A leading zero before the highway contract route number is not needed."
 - Acceptable: HC068 BOX 98D
 - Preferred: HC 68 BOX 98D"
 - USPS Pub 28 Sec. 253: "Print hyphens as part of the box number only when they are part of the address in the ZIP+4 File."
 - HC 68 BOX 19-2B "
 - USPS Pub 28 Sec. 254: "Change the designation STAR ROUTE, which usually refers to highway contract route, to HC."
 - Incorrect: STAR ROUTE 68 BOX # 45
 - Correct: HC 68 BOX 45"
 - USPS Pub 28 Sec. 255: "There should be no additional designations, such as town or street names, on the Delivery Address Line of highway contract route addresses. Street names used together with route and box numbers can create potential matching difficulty. Mailers are encouraged to use only one style of addressing. If secondary name information is used, however, place it above the Delivery Address Line."
 - Incorrect: HC 72 BOX 18 BRYAN DAIRY RD
 - Correct: HC 72 BOX 18"
 - USPS Pub 28 Sec. 256: "When applying a ZIP+4 code to a highway contract route address, an exact match is preferred. If a box number is included in the address, the mailpiece must bear the appropriate ZIP+4 code representing the range for that box

number. When box number information is not available, the highway contract base record must be used."

Overseas Military PSC, CMR, or UNIT Address Notes and Examples (per USPS Pub 28 sec. 225.1, 238.1, and 239)

- PSC stands for Postal Service Center. CMR stands for Common Mail Room.
- USPS Pub 28 Sec. 238.1: "The Delivery Address Line for all APO/FPO military mail must be standardized as follows:
 - PSC (CMR OR UNIT) NNNN
 - BOX NNNN
 - **Examples:**
 - CMR 830 BOX 51
 - PSC 1650 BOX 10
 - UNIT 908 BOX 111
- **APO, FPO; AA, AE, AP:** USPS Pub 28 Sec. 225.1 "Overseas military addresses must contain the APO or FPO designation along with a two-character "state" abbreviation of AE, AP, or AA and the ZIP Code or ZIP+4 code."
 - APO AE 09001-5275
 - FPO AP 96606-2783
 - APO AA 34035-4198
- APO stands for Army Post Office
- FPO stands for Field Post Office or Fleet Post Office
- AE is used for armed forces in Europe, the Middle East, Africa, and Canada;
- AP is for the Pacific; and
- AA is the Americas excluding Canada."
- **DPO:** USPS Pub 28 Sec. 239 The Delivery Address Line for DPO (Diplomatic Post Office) Department of State mail must be standardized to include the DPO designation and the appropriate two-letter abbreviation (AA, AE or AP), followed by the ZIP+4 or 5-digit ZIP Code.
- Complete Address Examples:
 - PSC 802 BOX 74 APO AE 09499-0074
 - UNIT 2050 BOX 4190 APO AP 96278-2050
 - UNIT 9900 DPO AE 09701-1000

XML Tag:

```
<
USPSPostalDeliveryRoute
>
```

XML Model:

```
<xsd:complexType name="USPSPostalDeliveryRoute_type">
  <xsd:sequence>
    <xsd:element name="USPSAddress" type="addr_type:USPSAddress_type"
      minOccurs="1" maxOccurs="1" />
    <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"
      maxOccurs="1" />

    <xsd:group ref="addr_type:AddressAttributes_group"
      minOccurs="0" maxOccurs="1" />
  </xsd:sequence>
  <xsd:attribute name="action" type="addr_type:Action_type"
    use="optional" />
</xsd:complexType>
```

XML Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4.2" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="addr addr.xsd ">
  <USPSPostalDeliveryRoute>
    <USPSAddress>
      <USPSRoute>
        <USPSBoxGroupType>RR</USPSBoxGroupType>
        <USPSBoxGroupId>2</USPSBoxGroupId>
      </USPSRoute>
      <USPSBox>
        <USPSBoxType>Box</USPSBoxType>
        <USPSBoxId>18</USPSBoxId>
      </USPSBox>
    </USPSAddress>
    <CompletePlaceName>
      <PlaceName>Largo</PlaceName>
    </CompletePlaceName>
    <StateName>FL</StateName>
    <ZipCode>33777</ZipCode>
  </USPSPostalDeliveryRoute>
</addr:AddressCollection>
```

Quality Measures

Pattern Sequence Measure

3.2.3.3 USPSGeneral Delivery Office

Syntax: { USPSGeneral Delivery Point * } + { Complete Place Name * } + { State Name * } + { Zip Code } + { Zip Plus 4 } + { Country Name }

Type 1: General Delivery:

USPSGeneralDeliveryPoint = "GENERAL DELIVERY" *

Syntax: "GENERAL DELIVERY" * + { Complete Place Name * } + { State Name * } + { Zip Code * } + "9999" + { Country Name }

Type 2: Overseas Military Address:

USPSGeneralDeliveryPoint = SHIP'S NAME

Syntax: SHIP'S NAME * + { "APO" or "FPO" * } + { "AE" or "AP" or "AA" * } + { Zip Code * } + { Zip Plus 4 } + { Country Name }

Defining Characteristics:

1. Addresses of this class must include a USPSGeneral Delivery Point in the specified format.
2. In addition, all thoroughfare, landmark, and postal addresses must include a Place Name and a State Name. A Zip Code is recommended but not mandatory.

Notes and Examples

General. In General Delivery addresses, the Complete Place Name element may include multiple Place Names, but the USPS recommends that only the postal community name be used. Example:

- Preferred: Wailuku, HI
- Acceptable: Wailuku, Maui, HI

General Delivery Addresses Note and Example {per USPS Pub 28 sec. 26}

- USPS Pub 28 Sec. 261: "Use the words GENERAL DELIVERY, uppercase preferred, spelled out (no abbreviation), as the Delivery Address Line on the mailpiece. Each record will carry the 9999 add-on code."
 - **Complete Example:**
 - GENERAL DELIVERY
 - TAMPA FL 33602-9999

Overseas Military Addresses Notes and Examples {per USPS Pub 28 sec. 225.1 and 238.1}

- USPS Pub 28 Sec. 238.1: "The Delivery Address Line for all APO/FPO military mail must be standardized as follows:
 - SHIP'S NAME

- **Example:**
 - USS SEA DEVIL SSN-664
- USPS Pub 28 Sec. 225.1 "Overseas military addresses must contain the APO or FPO designation along with a two-character "state" abbreviation of AE, AP, or AA and the ZIP Code or ZIP+4 code.
 - APO AE 09001-5275
 - FPO AP 96606-2783
 - APO AA 34035-4198
- AE is used for armed forces in Europe, the Middle East, Africa, and Canada;
- AP is for the Pacific; and
- AA is the Americas excluding Canada."
 - **Complete Example:**
 - USCGC HAMILTON
 - FPO AP 96667-3931

XML Tag:

```
<  
USPSGeneralDeliveryOffice  
>
```

XML Model:

```
<xsd:complexType name="USPSGeneralDeliveryOffice_type">  
  <xsd:sequence>  
    <xsd:element name="USPSGeneralDeliveryPoint"  
      type="addr_type:USPSGeneralDeliveryPoint_type" />  
    <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"  
      maxOccurs="1" />  
    <xsd:group ref="addr_type:AddressAttributes_group"  
      minOccurs="0" maxOccurs="1" />  
  </xsd:sequence>  
  <xsd:attribute name="action" type="addr_type:Action_type"  
    use="optional" />  
</xsd:complexType>
```

XML Example:

```
<?xml version="1.0" encoding="UTF-8"?>  
  <addr:AddressCollection version="0.4.2" xmlns:addr="addr"  
    xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"  
    xmlns:smil20="http://www.w3.org/2001/SMIL20/"  
    xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"  
    xmlns:xlink="http://www.w3.org/1999/xlink"  
    xmlns:xml="http://www.w3.org/XML/1998/namespace"
```

```
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="addr addr.xsd">
<USPSGeneralDeliveryOffice>
  <USPSGeneralDeliveryPoint>General Delivery</USPSGeneralDeliveryPoint>
  <CompletePlaceName>
    <PlaceName>Tampa</PlaceName>
  </CompletePlaceName>
  <StateName>FL</StateName>
  <ZipCode>33602</ZipCode>
  <ZipPlus4>9999</ZipPlus4>
</USPSGeneralDeliveryOffice>
</addr:AddressCollection>
```

Quality Measures

Pattern Sequence Measure

3.2.4 General Class

The general address class handles all of the above classes, for files in which the various classes may be mixed together, and addresses that do not conform to any of the above classes.

3.2.4.1 General Address Class

Syntax:

Type 1: The complete address as a single unparsed string of text.

Type 2: The complete address with place, state and zip code parsed out to a single field

{ Delivery Address * } + { Place State ZIP * }

Type 3: The complete address with place, state and zip code parsed out to separate fields

{ Delivery Address * } + { Complete Place Name * } + { State Name * } + {
Zip Code } + { Zip Plus 4 } + { Country Name }

Defining Characteristic: In addresses of this class the Delivery Address must be unparsed (except that in Types 2 and 3 the Complete Subaddress may be separated from the rest of the Delivery Address) and may contain thoroughfare, landmark, or postal syntaxes. This class may also include addresses that do not conform to any of the thoroughfare, landmark, or postal classes, including non-U.S. addresses.

Examples:

Type 1:

- Record 1: Address = 123 Main Street, Apt. 1, Ames, IA 50010
- Record 2: Address = Ames High School, Room 12, Ames, IA 50010
- Record 3: Address = PO Box 1511, Ames, IA 50010

Type 2:

- Record 1: Delivery Address = **123 Main Street, Apt. 1**; Place State ZIP = **Ames, IA 50010**
- Record 2: Delivery Address = **Ames High School, Room 12**; Place State ZIP = **Ames, IA 50010**
- Record 3: Delivery Address = **PO Box 1511**; Place State ZIP = **Ames, IA 50010**

Type 3:

- Record 1: Delivery Address = **123 Main Street, Apt. 1**; Complete Place Name = **Ames**; State Name = **IA**; Zip Code = **50010**
- Record 2: Delivery Address = **Ames High School, Room 12**; Complete Place Name = **Ames**; State Name = **IA**; Zip Code = **50010**
- Record 3: Delivery Address = **PO Box 1511**; Complete Place Name = **Ames**; State Name = **IA**; Zip Code = **50010**

Notes:

1. Address files often contain—and need to contain—street, landmark, and postal addresses mixed together. The general address class is intended to provide a basis for handling these kinds of files.
2. The general class provides a way to handle addresses that do not conform to any of the thoroughfare, landmark, or postal classes, including non-U.S. addresses.
3. In the general class, at minimum, the complex element Delivery Address is unparsed (except that in Types 2 and 3 the Complete Subaddress may be separated from the rest of the Delivery Address) and may contain thoroughfare, landmark, or postal syntaxes.
4. Within the general class, the three types differ as follows:
 - In Type 1, the entire address is a single unparsed string of text.
 - In Type 2, the Delivery Address line is separated from the Place State ZIP line.
 - In Type 3, the Complete Place Name, State Name, Zip Code, Zip Plus 4, and Country Name are separated from each other.
5. In Types 2 and 3, if the Complete Subaddress is separated from the rest of the Delivery Address, then the Delivery Address Type value should be "Subaddress Excluded".

XML Tag:

```
<
GeneralAddressClass
>
```

XML Model:

```
<xsd:complexType name="GeneralAddressClass_group">
  <xsd:choice>
    <xsd:element name="GeneralAddress"
      type="addr_type:GeneralAddress_type" />
    <xsd:sequence>
      <xsd:element name="USPSGeneralDeliveryPoint"
        type="addr_type:USPSGeneralDeliveryPoint_type" />
      <xsd:group ref="addr_type:PlaceStateZip_group"
        minOccurs="1" maxOccurs="1" />
      <xsd:group ref="addr_type:AddressAttributes_group"
        minOccurs="0" maxOccurs="1" />
    </xsd:sequence>
  </xsd:choice>
  <xsd:attribute name="action" type="addr_type:Action_type" />
</xsd:complexType>
```

XML Example: Type 1:

123 Main Street, Apt 1, Ames, IA 50010

Type 2:

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="addr addr.xsd ">
  <GeneralAddressClass>
    <DeliveryAddress>123 Main Street, Apt 1</DeliveryAddress>
    <CompletePlaceName>
      <PlaceStateZip>Ames, IA 50010</PlaceStateZip>
    </CompletePlaceName>
  </GeneralAddressClass>
</addr:AddressCollection>
```

Type 3:

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4.2" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="addr addr.xsd ">
  <GeneralAddressClass>
    <DeliveryAddress>123 Main Street, Apt 1</DeliveryAddress>
    <CompletePlaceName>
      <PlaceName>Ames</PlaceName>
    </CompletePlaceName>
  </GeneralAddressClass>
</addr:AddressCollection>
```

```
<StateName>IA</StateName>
<ZipCode>50010</ZipCode>
</GeneralAddressClass>
</addr:AddressCollection>
```

Quality Measures

Pattern Sequence Measure

3.3 Abstract Address Feature Class and Address Collection

3.3.1 Abstract Address Feature Class

All of the address classes described above are specific implementations of an abstract Address Feature class. The Address Feature class is compatible with the abstract Feature class that is generally described in the FGDC Geographic Information Framework Data Content Standard, Base Part, section 7.8.1. The Address Feature is modeling concept used to bind together within the framework. It is described in more detail in Part 4 of this standard.

3.3.2 Address Collection

An Address Collection is an aggregation of address data with its associated metadata, which can then be transferred from one party to another. The Address Collection conforms to the Feature Collection construct that is generally described in the FGDC Geographic Information Framework Data Content Standard, Base Part, section 7.8.1. The Address Collection is described in more detail in Part 4 of this standard.

4. Part 3: Address Data Quality

4.1 Introduction

4.1.1 Purpose

The purpose of Part Three is to help users assess the quality of their address data. It provides ways to measure the caliber of each element, attribute, and classification. Some measures compare values to Address Reference System (ARS) specifications or domains of values. Others check internal consistency, one of the most important aspects of addresses. Addresses are interdependent: the validity of all can be affected by some. Parity, for example, is an important part of address assignment. In most address reference schemes, even and odd addresses on the same side of the street disrupt normal address usage. While the assignment of each address is important patterns, usually described in the (ARS), make the system work. The methods describe ways to discover anomalies, in isolation, in relationships between data and in relationship to the ARS, and how to report the quality of the data.

4.1.2 Quality definition

Measuring quality requires a definition for quality. Existing standards provide ample source material. Those standards describing addresses, however, focus on the utility of a data set for specific purposes. The National Emergency Number Association (NENA), for example, has documented exchange standards that include a way to describe address quality relative to an established Automatic Location Information (ALI) files. Similarly, the United States Postal Service (USPS) Postal Addressing Standards describe addresses as used for mailing. These application-specific assessments fulfill the purpose of their respective documents.

Assessing the quality of address data content independent of formats or specific uses, however, is a very different task. It requires information on each of the many aspects of address information. Evaluations for a specific purpose can be constructed from that information, with criteria varying according to each application. Constructing more generically useful methods for assessing address quality starts with the structure for those methods, the elements of address quality.

4.1.2.1 Elements of Address Quality

Definitions for the quality of address data content are supplied by standards for spatial metadata. These are primarily represented by two documents, the \x{feff}ISO 19115:2003 Geographic information -- Metadata\x{feff}Content Standard for Digital Geospatial Metadata (CSDGM), Vers. 2 (FGDC-STD-001-1998). The Spatial Data Transfer Standard (SDTS: ANSI NCITS 320-1998) touches on the subject, as does ISO 19113:2002 Quality Principles.

These standards have quality reporting requirements that identify the elements of the genus spatial data, of which addresses are a species. These elements provide guidance for the various aspects of quality control, and for classifying the various measures listed in this section. If all of them are satisfied, a data set has been thoroughly checked. The measures are listed by quality element in Appendix G.

There is remarkable agreement among the documents on the elements of spatial data quality. Each of the standards that approach that question describes the same core elements:

- Attribute (Thematic) Accuracy
- Completeness
- Lineage
- Logical Consistency
- Positional Accuracy
- Temporal Accuracy

Even the names of the elements are essentially identical. CSDGM and SDTS discuss "Attribute Accuracy," while the same content is described as "Thematic Accuracy" in ISO 19115. ISO 19113 includes temporal accuracy as one of the data quality elements, defined as "accuracy of the temporal attributes and temporal relationships of features" (ISO 19113:2002(E), 5.2.1), and this definition remains constant throughout the ISO series. Temporal attributes are not separated from other types of attributes in the CSDGM, although various types of time period entries are listed throughout the standard.

Quality Elements	Standards			
	CSDGM	SDTS	ISO 19113	ISO 19115
Dataset Purpose	†	•	•	•
Dataset Use	†	•	•	•
Attribute (Thematic) Accuracy	•	•	•	•
Logical Consistency	•	•	•	•
Temporal Accuracy	†	†	•	•
Completeness	•	•	•	•
Positional Accuracy	•	•	•	•
Lineage	•	•	•	•

• Specified by name in the standard.

† Provision made for the information in the standard, but not specified by name.

4.1.3 Anomalies: Uncertainty and Addresses

Quality control for address content is unusual in that it is normal to carry inconsistencies in a data set indefinitely. Those inconsistencies are simply the result of the addressing process. A given locality may not have always applied its Address Reference System (ARS) systematically, or the ARS may have changed. Street names may have changed, or the ground conditions changed in some other way.

These inconsistencies are called "anomalies" throughout this document. It is difficult to call them errors: the conditions that create the anomalies will persist, and many of the individual inconsistencies will never be changed. Finally, address information is essential to core, shared databases in many enterprises. Sharing the information involves communications of all kinds, including face-to-face conversations. Plainly, the word "error" can be less than diplomatic in workplace discussions.

4.1.3.1 Using Address Anomaly Status

The Address Anomaly Status attribute provides a way of documenting and accounting for anomalies. This attribute should be assigned after an inconsistent address is researched. After it is assigned, records documented as anomalies can be excluded from quality testing. This practice reduces ambiguity, and prevents repeated research on the same addresses.

4.2 Measuring Address Quality

4.2.1 About the Measures

The quality control tests follow a simple recipe:

1. Compare address data to domains and specifications tailored for local use
2. Identify anomalies

Tests are designed to provide data quality element information as described in ISO 19115. The test specification includes:

- Scope: the elements, attributes or classifications to be tested
- Measure: a description of what the test measures.
- Procedure: a description of the test
- Script or Function: an example of the test in SQL code, or pseudocode where the exact parameters are more difficult to anticipate. The scripts and functions were written (except where noted otherwise) using standard ISO/IEC 9075-1:2008 SQL. Exact coding will vary from system to system. Spatial predicates used in the measures are described in OpenGIS Simple Features Specification for SQL. Where the code or pseudocode uses predicates beyond the SFSQL standard, they are also noted.
- Parameters for calculating anomalies as a percentage of the data set

4.2.1.1 About Anomalies

Measures are described with the understanding that records with known anomalies are excluded from related tests. New anomalies discovered should be corrected or described with Address Anomaly Status attributes.

4.2.1.2 Calculating Conforming Records as a Percentage of the Data Set

The Perc Conforming function measures the results of test for anomalies and describes the percentage of data elements that conform. Calculating the percentage of conformance requires inverting the query: the number of anomalies found is subtracted from the total number of records before calculating the percentage.

4.2.1.3 Function: Calculating Conforming Records as a Percent of the Data Set

Description

The function receives information directly from SQL statements including the standard COUNT aggregator and calculates percentages.

Function

```
CREATE OR REPLACE FUNCTION perc_conforming( integer, integer )
RETURNS numeric as $$

DECLARE
    nonconforming alias for $1;
    total_recs alias for $2;
    calc_perc numeric;

BEGIN

    SELECT INTO calc_perc
    ROUND( ( ( total_recs - nonconforming )::numeric / total_recs::numeric
    ) * 100, 2 );

    RETURN calc_perc;

END;

$$ language 'plpgsql';
```

Pseudocode Query

```
SELECT
    perc_conforming
(
    ( SELECT
        COUNT(*) as nonconforming
        FROM
            Address Collection
        WHERE
            condition is not met
    )::integer,
    ( SELECT
        COUNT(*) as total_recs
        FROM
            Address Collection
    )::integer
)
;
```

Successful Result: 100% Conforming

```
perc_conforming
-----
100.00
(1 row)
```

Unsuccessful Result: 30% Conforming

```
perc_conforming
-----
30.00
(1 row)
```

Notation

The tests are described using SQL constructs and operators.

Operators used include:

Operator	Description	SQL Example Statement	Statement Result
	concatenation	SELECT 'a' 'b';	ab
%	modulo	SELECT 5 % 2;	1
::	type casting	SELECT '0005)::integer;	5
~	pattern matching	SELECT Complete Street Name where Complete Street Name ~ 'Main';	Main Street

4.2.2 Applying Measures to Domains of Values

Domains of values are an important tool for controlling values for address components. Measures used to test data conformance depend on the type of domain. The Content Standard for Digital Geospatial Metadata (CSDGM) classifies domains as enumerated, range, codeset and unrepresentable. The following table lists the CSDGM definition for each type of domain, as listed in *Section 5: Entity and Attribute Information*, along with the measures associated with each.

Domain Type	CSDGM Definition	Quality Measures	Quality Notes
codeset	"reference to a standard or list which contains the members of an established set of valid values."	Tabular Domain Measure Spatial Domain Measure	The U.S. Postal Service list of "Primary Street Suffix Names" is a familiar example of a codeset domain. In cases where specific street suffixes are associated with a given area in the Address Reference System, the association should also be checked with the Spatial Domain Measure.
enumerated	"the members of an established set of valid values."	Tabular Domain Measure Spatial Domain Measure	A local, validated street name list is an example of an enumerated domain. In cases where specific types of values are associated with a given area in the Address Reference System, the association should also be checked with the Spatial Domain Measure.
range	"the minimum and maximum values of a continuum of valid values."	Range Domain Measure	Range domain examples include such things as minimum and maximum Address Number values set by some jurisdictions, or a

Domain Type	CSDGM Definition	Quality Measures	Quality Notes
		Spatial Domain Measure Address Number Fishbones Measure	range of address values assigned to a given grid cell in the Address Reference System. In the latter case, the Spatial Domain Measure would be required to validate the location of the grid cell. Many Address Number values are associated with a Two Number Address Range or a Four Number Address Range. In the latter case conformance can be checked with the Address Number Fishbones Measure.
unrepresentable	"description of the values and reasons why they cannot be represented."		

4.3 How to use the Measures in a Quality Control Program

4.3.1 Preparation

The measures assume a certain body of knowledge about local addresses. Preparation for a local quality control program largely consists of assembling that information. These include:

- Tabular domains of values for street name components
- Spatial domains: jurisdiction boundaries, address reference scheme boundaries and components
- Address reference schemes: geometry and rules.

Tabular domains are frequently difficult to complete, as no organized list of street names may be available. In the latter case all available sources of street names should be compiled and checked against source documents such as plats and ordinances where possible. Official Status attributes may be helpful in assembling and maintaining domains of values. It will be normal to find a variety of street name abbreviations in use: Doctor Martin Luther King Junior Boulevard, MLK Boulevard, etc. Official Status attributes can help describe variations on street names that may appear in addresses assigned to the same location, or along the same street. As noted throughout the standard, the official name should be completely spelled out: Doctor Martin Luther King Junior Drive.

Address reference systems or other local conventions may govern much more than street number assignment. There may be street classification requirements for specific Street Name Post Type names. For instance, some jurisdictions may require "Courts" to be

deadends, and forbid "Boulevards" on the same deadends. Street names may conform to themes in particular areas: numbers, birds, trees and presidents are some examples. The latter rule may be satisfied by applying the Spatial Domain Measure, but the former will require locally formulated tests. In any case, local conditions will require attention in drawing up a complete list of standard and local quality measures.

4.3.2 Construction

Once all of the domains and rules have been assembled, use the guidance in Parts One and Two to assemble a list of measures for each aspect of your data. Informative Appendices D through G can be helpful in maintaining an overview of the process. Order the measures, beginning with the most basic: check simple elements and attributes first, then complex elements, then classifications. In cases where a quality check is beyond the scope of the standard create, name and document your own test, taking care to chose a name that does not duplicate one in the standard. It will be important to have the method completely documented both for maintenance, and in order to convey complete quality information to address users.

The table below shows how specific needs in a quality program for an E911 center match to measures.

Description	Measure
Number/percent of MSAG-valid street segments without street names	RelatedNotNullMeasure
Number/percent of MSAG-valid street segments without address ranges	RelatedNotNullMeasure
Sort by distinct and count: various street name elements	UniquenessMeasure
Street name elements must be MSAG-valid	Related Element Value Measure
All street segments must be broken and snapped at street intersections, ESN boundaries, and community boundaries	Beyond the scope of the standard
Direction of street segment must follow real-world ranges	AddressRangeDirectionalityMeasure
Ranges may not overlap in the same community	OverlappingRangesMeasure
"To" range must be greater than "From" range on each street segment	LowHighAddressSequenceMeasure
Street segments must be free of parity errors	LeftRightOddEvenParityMeasure
Divided highways, freeways, and streets (divided	Beyond the scope of the standard

Description	Measure
by median) must be depicted as two line segments	
The ALI database must have at least a 95% match rate to the GIS centerline layer (98% in other states)	AddressNumberFishbonesMeasure
Centerline address ranges should include ranges in MSAG (i.e. - actual vs. theoretical)	RangeDomainMeasure
Other comparisons (other address DBs)	Related Element Value Measure
Reference: Control points, Other accurate layers (aerial imagery, parcel boundaries, etc)	Beyond the scope of the standard

-- Example QC program courtesy of Adam Iten

4.3.3 Testing

Construct SQL statements specific to your system from the code or pseudocode given in the standard, and test them. Run all the measures on a test data set to make sure they produce believable results. Where known address problems are not discovered by the measures, review how the measures are applied and double check the SQL. Check to make sure that all measures of quality are thoroughly tested: attribute (thematic) accuracy, logical consistency, temporal accuracy, completeness, positional accuracy and lineage. Where there is insufficient information to check a given aspect of quality the address process may need review.

4.3.4 Interpreting Results

The measures are written to produce sets of identifiers. In practice it's important to see data in context. In a normalized relational database it is most often easiest to construct a view to display the data you want to see. The AddressPtCollection and StCenterlineCollection views can provide the ancillary information to describe query results.

4.3.5 Implementation

Once a suite of measures has been constructed and tested, implementation consists of deciding when it will be run, and how to handle the results. Both depend on the process used to assemble a given data set. For example, where a number of datasets from separate organizations are assembled to create a master address repository, a complete suite of tests may be run on each individual dataset before acceptance. The data may only be incorporated into the repository when the anomalies are either attributed and accepted as part of the data set, or resolved. Once the data are incorporated, it is risky to believe the combined data will test identically to each individual data set. While the street name components may be identical, other aspects may be affected by the inherent interdependence of addresses. The results of Address Number Fishbones Measure, for example, may be very different when new data are added. Quality control

implementation, therefore, may require developing several suites of quality measures to support each part of the address process.

User confidence in a data set depends on an effective program. Test thoroughly, and document what you did. Recording dates and times is often an important part of that documentation. Users will question aspects of the data. Knowing the condition of the data over time simplifies your response, and increases both the reality and perception of the value of the data.

4.3.6 Maintenance

Addressing is a dynamic process. Just as the construction of testing suites is based on the process, testing suites need to be reexamined each time a process that produces data changes.

4.4 How to Prepare Data for Quality Control

No specific database design is required for using the quality measures presented here. The measures rely on the views, tables and pseudocode descriptions listed below.

View, Table or Description	Type	Description
AddressPtCollection	View	A view comprising elements and attributes for thoroughfare addresses, including point geometry.
StCenterlineCollection	View	A view of street centerline segments, including Two Number Address Range or Four Number Address Range attributes and line geometry
Pseudocode data	Descriptions	In some cases a measure may apply broadly. The UniquenessMeasure is one example: it may apply in many circumstances. Data is described in a more general way with pseudocode.
Elevation Polygon Collection	Table	A set of polygons built from contours of elevation, used in the Address Elevation Measure
StreetsNodes	Table	Startpoints and endpoints of street segments, with associated street name information. This table has a foreign key relationship with the Nodes table.
Nodes	Table	Unique point locations found in StreetsNodes. These are, effectively, intersection and endpoints. Where two streets intersect, for example, four records in StreetsNodes have the same Nodes foreign key value

Performing a suite of measures for any given address data set will be aided by creating the views and tables required for those measures. Views are used to illustrate the majority of queries in the interest of supporting a variety of database designs. These are often useful to maintain in a database for general use. Although they are not in and of themselves a database design, they can assist in the use of a more normalized set of tables. Any of the optional elements or attributes listed in the table may be omitted if they are not required for the data set itself. The views are "wide" and, depending on the complexity of the underlying database may be best supported as materialized views. A materialized view is a table, often maintained by triggers or queries, created instead of a view in the interest of efficiency.

The AddressPtCollection and StCenterlineCollection views are listed below, followed by a brief discussion of the Streets Nodes and Nodes tables required for some of the measures. Finally, the Elevation Polygon Collection required for the Address Elevation Measure is described.

4.4.1 Views

The queries for composing those views will vary according to the design of the underlying database.

4.4.1.2 Address Point Collection (AddressPtCollection)

Field Name	Description
Address ID	Address attribute
AddressCompleteStreetNameID	A unique identification number assigned to each Complete Street Name
Related Transportation Feature ID	Address Transportation Feature ID
Complete Address Number	Address element
Address Number Prefix	Address element
Address Number	Address element
AddressNumberAttached	Example of an Attached Element. Can be inserted between Complete Address Number or Complete Street Name components as needed.
Address Number Suffix	Address element
AddressCompleteStreetName	Address element: Complete Street Name
Street Name Pre Modifier	Address element

Field Name	Description
Street Name Pre Directional	Address element
Street Name Pre Type	Address element
Separator Element	Address element
Street Name	Address element
Street Name Post Type	Address element
Street Name Post Directional	Address element
Street Name Post Modifier	Address element
Place Name	Address element
Zip Code	Address element
Address Side Of Street	Address attribute
Address Number Parity	Address attribute
Address Authority	Address attribute
Address Feature Type	Address attribute
Address Elevation	Address attribute
Address Lifecycle Status	Address attribute
Official Status	Address attribute
BuildingPermit	A boolean field describing whether or not a building permit has been issued.
Address Start Date	Address attribute
Address End Date	Address attribute
Address XCoordinate	Address attribute
Address YCoordinate	Address attribute
Address Longitude	Address attribute
Address Latitude	Address attribute
Delivery Address Type	Address attribute

Field Name	Description
USNational Grid Coordinate	Address attribute
AddressPtGeometry	The point geometry for the address

4.4.1.3 Street Centerline Collection (StCenterlineCollection)

Field Name	Description
Address Transportation Feature ID	Address Transportation Feature ID
StCenterlineCompleteStreetNameID	The unique identification number assigned to the Complete Street Name pertaining to each centerline or transportation feature associated with the address
Range.Low	A placeholder for low values in a Four Number Address Range or Two Number Address Range
Range.High	A placeholder for high values in a Four Number Address Range or Two Number Address Range
StCenterlineCompleteStreetName	Address element: Complete Street Name
StCenterlineStreetNamePreModifier	Address element: Street Name Pre Modifier
StCenterlineStreetNamePreDirectional	Address element: Street Name Pre Directional
StCenterlineStreetNamePreType	Address element: Street Name Pre Type
StCenterlinePreTypeAttachedElement	Address element: Attached Element. This is an example. Attached elements may occur anywhere a Complete Address Number or Complete Street Name.
StCenterlineStreetName	Address element: Street Name
StCenterlineStreetNamePostType	Address element: Street Name Post Type
StCenterlineStreetNamePostDirectional	Address element: Street Name Post Directional
StCenterlineStreetNamePostModifier	Address element: Street Name Post Modifier
PlaceNameLeft	Address element: Place Name
PlaceNameRight	Address element: Place Name

ZipCodeLeft	Address element: Zip Code
ZipCodeRight	Address element: Zip Code
StCenterlineGeometryDirection	The cardinal direction of the line: "east-west" or "north-south"
Address Range Directionality	Address attribute
StCenterlineGeometry	Line geometry for the street centerline or transportation feature associated with the address

4.4.2 Tables

4.4.2.1 Nodes and StreetsNodes

About Nodes

Nodes are the end points for each road segment. They are used throughout Address Data Quality in checking features at intersections. The code examples below show how to create and fill one version of the tables required. There are a wide variety of variations that will work. For example, in a more normalized database the Complete Street Name field may be replaced by a foreign key. This particular example is given in PostgreSQL/PostGIS. The specifics will vary across systems.

The tables are:

1. StreetsNodes, a table correlating nodes with the street names assigned to segments connecting at those nodes.
2. Nodes, a table to hold the nodes themselves.

Nodes

Where street segments intersect, multiple nodes will have the same geometry. This table selects unique node points. The geometries are matched back to the StreetNodes table so that each record has a node identifier referencing an unique geometry.

The following transaction creates the table. The Nodes table must be created before StreetsNodes to provide for the reference to it in the latter table.

```
begin;

create table Nodes
(
    id serial primary key
)
;

select addgeometrycolumn( 'nodes' , 'nodes' , 'geom' , -1 , 'POINT' , 2 );

end;
```

StreetsNodes

The transaction below creates and fills the table.

```
begin;
```

```
create table StreetsNodes
(
    id serial primary key,
    Nodesfk integer references Nodes,
    RelatedTransportationFeatureID integer,
    CompleteStreetName varchar(100),
    seg_end varchar(4)
)
;

select addgeometrcolumn( 'nodes' , 'StreetsNodes' ,
'geom', -1, 'POINT', 2);

insert into StreetsNodes( RelatedTransportationFeatureID,
CompleteStreetName, seg_end, geom )
(
    select
        id,
        CompleteStreetName,
        'from',
        st_startpoint( geom )
    from
        StCenterlineCollection
)
union
(
    select
        id,
        CompleteStreetName,
        'to',
        st_endpoint( StCenterlineGeometry )
    from
        StCenterlineCollection
)
;
end;
Fill the Nodes table from the data captured in StreetsNodes
insert into
    Nodes( geom )
select distinct
    geom
from
    StreetsNodes
;
Finally, the statement below fills the nodesfk field in the
StreetsNodes table.

update
    StreetsNodes
set
    Nodesfk = foo.Nodesfk
```

```
from
(
  select
    a.id as Nodesfk,
    b.id
  from
    Nodes a
      inner join StreetsNodes b
        on equals( a.geom, b.geom )    equals( a.geom, b.geom )
) as foo
where
  foo.id = StreetsNodes.id
;

end;
```

4.4.2.2 Elevation Polygon Collection

Field Name	Description
ElevationPolygonID	Primary key
AddressElevationMin	Lowest elevation of the contours bounding the polygon
AddressElevationMax	Highest elevation of the contours bounding the polygon
ElevationPolygonGeometry	Polygon geometry

4.5 Quality Measures

4.5.1 AddressCompletenessMeasure

Measure Name

Address Completeness Measure

Measure Description

This measure compares the number of addressable objects with the address information recorded. There are a number of circumstances where more than one address is assigned to an addressable object. Addressable objects without addresses, however, are anomalies unless described by a domain of exceptions.

Report

Completeness

Evaluation Procedure

Compare the number of addressable objects with the address information recorded.

Spatial Data Required

Geometry describing addressable objects attributed with Address ID, and polygon(s) describing Address Reference System extent. The example below uses the AddressPtCollection view.

Code Example: Testing Records

Note that this query assumes that both the feature types and the addresses are assumed to be within a given Address Reference System Extent.

```
SELECT
    a.AddressFeatureType
FROM
    AddressFeatureType a
    LEFT JOIN AddressPtCollection b
        ON a.AddressFeatureType = b.AddressFeatureType
            INTERSECTS( a.Geometry, b.AddressPtGeometry )
WHERE
    b.AddressID is null
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( * )
FROM
    AddressFeatureType a
    LEFT JOIN AddressPtCollection b
        ON b.AddressFeatureType = a.AddressFeatureType
            INTERSECTS( a.Geometry, b.AddressPtGeometry )
WHERE
    b.AddressID is null
```

count_of_total_records

```
SELECT
    COUNT( a.* )
FROM
    FeatureType a
```

Result Report Example

Tested Address Completeness Measure at 87% conformance.

4.5.1 AddressElevationMeasure

Measure Name

AddressElevationMeasure

Measure Description

This measure checks each elevation in an address point collection against polygons created from contours of elevation.

Report

Attribute (Thematic) Accuracy

Evaluation Procedure

Check each elevation identified by the measure as outside the range defined by the polygons.

Spatial Data Required

AddressPtCollection, Elevation Polygon Collection

Code Example: Testing Records

```
SELECT
    a.AddressID
FROM
    AddressPtCollection a
    LEFT JOIN ElevationPolygonCollection b
        ON INTERSECTS( a.AddressPtGeometry, b.ElevationPolygonGeometry
)
WHERE
    NOT( a.AddressElevation BETWEEN b.AddressElevationMin and
b.AddressElevationMax )
```

Code Example: Testing the Conformance of the Data Set

Function

See Perc Conforming for the sample query

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( * )
FROM
    AddressPtCollection a
    LEFT JOIN ElevationPolygonCollection b
        ON INTERSECTS( a.AddressPtGeometry, b.ElevationPolygonGeometry
)
WHERE
    NOT( a.AddressElevation BETWEEN b.AddressElevationMin and
b.AddressElevationMax )
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    AddressPtCollection
```

Result Report Example

Tested AddressElevationMeasure at 90% conformance.

4.5.2 AddressLeftRightMeasure

Measure Name

AddressLeftRightMeasure

Measure Description

This measure checks stored values describing left and right against those found by geometry. Left and right attributes are frequently entered by hand, an error-prone process. It is important to confirm the actual locations of the addresses. Even where the initial left/right information was derived from the geometry, edits to the data may have changed the parity relationships. This information is central to confirming the conformance of the address assignment to the local Address Reference System.

Note that the measure is constructed with overlapping ranges where an address is found precisely aligned with the road centerline. In these cases two records will be generated: one describing the point on the left side of the centerline, another describing it on the right. In these few cases it is simply practical to use the record that conforms to the Address Reference System and eliminate the other.

Address Left Right Measure is a prerequisite to Left Right Odd Even Parity Measure. An example of finding these duplicate records is included, as well as an example of comparing the mathematically determined sides against those recorded by hand.

Remember when examining the results that the side is determined by the Address Range Directionality of the centerline geometry. If all the from ends of the centerline segments are at the low addresses and the to ends of the centerline segments at the high addresses, then the results will be consistent. In the latter case, it is possible to evaluate whether the odd and even Address Number values are consistently on the left or right of the segment without also accounting for Address Range Directionality. Where Address Range Directionality is inconsistent, however, it must also factor into left/right evaluation.

Report

Logical Consistency

Evaluation Procedure

Determine the left/right status of the location of each address point. Where there is a value recorded in the database, check it against the side as calculated.

Spatial Data Required

Street centerline (or other transportation feature) and address point locations. The Address Transportation Feature ID for the transportation feature associated with each address must be recorded with the address points

Code Example: Assembling Data from Views

```
--  
-- Calculate the angle at which a line drawn from the address point to the  
-- closest point along the centerline meets a specific segment and determine  
-- right and left from that angle.  
--  
-- Insert the left/right results, along with all the relevant identifiers, into  
a table.  
--  
CREATE TABLE AddressLeftRight  
(  
    id serial primary key,  
    "AddressID" text,
```

```
"AddressTransportationFeatureID" text,
"Side"
)
;

INSERT INTO AddressLeftRight
(
    "AddressID",
    "AddressTransportationFeatureID",
    "Side"
)
SELECT DISTINCT
    foo."AddressID",
    foo."AddressTransportationFeatureID",
    CASE
        WHEN
            (
                degrees( azimuth( foo."Pt1", foo."AddressPtGeometry" ) )
                -
                degrees( azimuth( foo."Pt1", foo."Pt2" ) )
            ) between 0 and 180
        THEN 'right'
        WHEN
            (
                degrees( azimuth( foo."Pt1", foo."AddressPtGeometry" ) )
                -
                degrees( azimuth( foo."Pt1", foo."Pt2" ) )
            ) between 180 and 360
        THEN 'left'
        WHEN
            (
                degrees( azimuth( foo."Pt1", foo."AddressPtGeometry" ) )
                -
                degrees( azimuth( foo."Pt1", foo."Pt2" ) )
            ) between -180 and 0
        THEN 'left'
        WHEN
            (
                degrees( azimuth( foo."Pt1", foo."AddressPtGeometry" ) )
                -
                degrees( azimuth( foo."Pt1", foo."Pt2" ) )
            ) between -360 and -180
        THEN 'right'
    END as "Side"
FROM
    --
    -- Calculate the point on the related centerline closest to the
    address.
    -- Calculate the start point and end point of each segment of the
    centerline.
    --
    (
        SELECT
            a."AddressID",
            b."AddressTransportationFeatureID",
            a."AddressPtGeometry",
            st_line_interpolate_point
```

```
( b."StCenterlineGeometry",
    st_line_locate_point( b."StCenterlineGeometry",
a."AddressPtGeometry" )
    ) as "ClosestPtOnStCenterline",
pointn
( b."StCenterlineGeometry",
    generate_series( 1, ( numpoints( b."StCenterlineGeometry"
) - 1 ) )

    ) as "Pt1",
pointn
( b."StCenterlineGeometry",
    generate_series( 2, numpoints( b."StCenterlineGeometry" )
)

    ) as "Pt2"
FROM
address."AddressPtCollection" a
inner join address."StCenterlineCollection" b
on a."RelatedTransporationFeatureID" =
b."AddressTransportationFeatureID"
) as foo
WHERE
st_intersects( st_expand( foo."ClosestPtOnStCenterline", 1 ),
    st_makeline( foo."Pt1", foo."Pt2" )
)
;
;
```

Notes

The query to assemble left-right information contains a number of functions proprietary to PostGIS and PostgreSQL as listed below.

st_line_locate_point

Linear referencing function to determine the location of the closest point on a given linestring to a given point.

st_line_interpolate_point

Linear referencing function to create a point at a specified location along a linestring.

st_makeline

Geometry constructor.

generate_series

A set-returning function that generates a series of values.

Code Example: Checking for Address Points with both Left and Right Records

This query would describe few, if any records. Such records occur when an address point is perfectly align with one end of a centerline, for example at the end of a cul-de-sac. These addresses should be resolved in favor of the local left-right parity rules before proceeding with queries based on left/right data.

```
SELECT
    foo.AddressID,
    bar.Side
FROM
```

```
(  
    SELECT  
        Address ID  
    FROM  
        AddressLeftRight  
    GROUP BY  
        Address ID  
    HAVING  
        count( Address ID ) > 1  
    ) as foo,  
    AddressLeftRight as bar  
WHERE  
    foo.AddressID = bar.AddressID  
;
```

Code Example: Checking Left/Right Attributes

This query produces a list of Address ID values for which the left/right attribute cannot be checked by the left/right information in the table populated by the queries above, or where the left/right attribute conflicts with query results.

```
SELECT  
    a.AddressID  
FROM  
    AddressPtCollection a  
    LEFT JOIN AddressLeftRight b  
    ON a.AddressID = b.AddressID  
WHERE  
    a.Side != b.Side  
;
```

Code Example: Testing the Conformance of a Data Set

Function

see Perc Conforming for the sample query.

Function Parameters

count_of_nonconforming_records

```
SELECT  
    count( a.AddressID )  
FROM  
    AddressPtCollection a  
    left join AddressLeftRight b  
    on a.AddressID = b.AddressID  
WHERE  
    a.Side != b.Side  
;
```

count_of_total_records

```
SELECT  
    count(*)  
FROM  
    AddressPtCollection  
;
```

Result Report Example

Tested Address Left Right Measure at 85% conformance.

4.5.3 AddressLifecycleStatusDateConsistencyMeasure

Measure Name

AddressLifecycleStatusDateConsistencyMeasure

Measure Description

This measure tests the agreement of the Address Lifecycle Status with the development process. This query is far more conceptual than many others in this section of the standard for the simple reason that the development processes, and the data it generates, vary considerably from place to place.

It is common to track the starting and ending dates of each Address Lifecycle Status value. Address Start Date and Address End Date are notably different, not directly attached to any given Address Lifecycle Status value. Checking the validity of any given Address Lifecycle Status requires checking both the Address Start Date and Address End Date values, and data from the development process.

The query for testing records assumes a process where the issuance of a building permit describes the transition of an address from potential or proposed to active. Any given development process is likely to have a longer, more complicated list of conditions. Reports using this measure should include the final query used.

Report

Temporal Accuracy and/or Logical Consistency

Evaluation Procedure

Check entries where the Address Lifecycle Status conflicts with the Address Start Date or Address End Date, or with the development process. Refine the query as needed to track the development process as it affects Address Lifecycle Status and make sure the records are contemporaneous.

Spatial Data Required

None

Code Example: Testing Records

```
SELECT
    AddressID
FROM
    AddressPtCollection
WHERE
    (
        AddressLifecycleStatus = 'Potential'
        AND
        ( BuildingPermit IS NOT NULL
        OR
        AddressStartDate IS NULL
        OR
        AddressEndDate IS NOT NULL
```

```
)  
)  
OR  
(  
    AddressLifecycleStatus = 'Proposed'  
    AND  
        ( BuildingPermit IS NOT NULL  
        OR  
            AddressStartDate IS NULL  
        OR  
            AddressEndDate IS NOT NULL  
    )  
OR  
(  
    AddressLifecycleStatus = 'Active'  
    OR  
    AddressStartDate IS NULL  
    OR  
    AddressEndDate IS NOT NULL  
)  
OR  
(  
    AddressLifecycleStatus = 'Retired'  
    AND  
    AddressEndDate IS NULL  
)
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT  
    count( * )  
FROM  
    AddressPtCollection  
WHERE  
(  
    AddressLifecycleStatus = 'Potential'  
    AND  
        ( BuildingPermit IS NOT NULL  
        OR  
            AddressStartDate IS NULL  
        OR  
            AddressEndDate IS NOT NULL  
    )  
)  
OR  
(  
    AddressLifecycleStatus = 'Proposed'  
    AND  
        ( BuildingPermit IS NOT NULL  
        OR  
            AddressStartDate IS NULL  
    )
```

```
        OR
        AddressEndDate IS NOT NULL
    )
OR
(
    AddressLifecycleStatus = 'Active'
    OR
    AddressStartDate IS NULL
    OR
    AddressEndDate IS NOT NULL
)
OR
(
    AddressLifecycleStatus = 'Retired'
    AND
    AddressEndDate IS NULL
)

count_of_total_records

SELECT
    COUNT( * )
FROM
    AddressPtCollection
```

Result Report Example

Tested AddressLifecycleStatusDateConsistencyMeasure at 65% conformance.

4.5.4 AddressNumberFishbonesMeasure

Measure Name

AddressNumberFishbonesMeasure

Measure Description

This measure generates lines between addressed locations and the corresponding locations along the matching Overlapping Ranges Measure to check the spatial sequence of Address Number locations. The pattern created by these lines frequently resembles a fishbone.

This query is most often used where the Two Number Address Range or Four Number Address Range values are present and trusted. If those values are not present or are suspect the geocoded points may be produced without reference to the ranges. For example, points may be generated along the closest street centerline with a matching Complete Street Name value, directly opposite the addresses. This process, with the results diligently checked, allows the ranges themselves to be checked against an inventory of the address numbers actually located along the segment.

In addition to checking Address Number sequence anomalies, this query can be used to fill the Related Transportation Feature ID field in the AddressPtCollection.

Report

Logical Consistency

Evaluation Procedure

Fishbones will reflect the Address Reference System applied in a given area, and the points used.

Examples of addresses to check include those where:

- There is no fishbone
- This may show an address with a Complete Street Name value that doesn't match anything in the StCenterlineCollection
- The fishbone touches one or more other fishbones, either crossing them or intersecting in some other way
- Address Number values may have been assigned out of order. Another possibility, especially in more sparsely settled areas, is that the address assignment as determined by the location of the property access, and the fishbones are being drawn from buildings on the property. It's important to generate fishbones that reflect assignment practice.
- The fishbone crosses street centerlines
- There may be inconsistencies in the Complete Street Name values recorded in the AddressPtCollection and the StCenterlineCollection.
- The fishbone extends further than expected. In many areas fishbone lines ≥ 1000 feet (304.8 meters) require investigation
- These may indicate variations in street names that need to be resolved, especially when a fishbone crosses a jurisdiction. Alternatively, there may be segments missing or unnamed theStCenterlineCollection.
- Bunch at the end of a street segment, forming a bowtie
- These frequently indicate address ranges that inappropriately begin with zero (0).

Spatial Data Required

AddressPtCollection and a set of geocoded points along the street centerline, called GeocodedPtZeroOffset in the query.

Code Example: Testing Records

```
Creating a table to hold the fishbones
CREATE TABLE Fishbones
(
    id SERIAL PRIMARY KEY,
    AddressID INTEGER NOT NULL REFERENCES AddressPtCollection,
    RelatedTransportationFeatureID TEXT REFERENCES
    StCenterlineCollection,
    Geometry geometry
)
```

Query to test records

```
INSERT INTO
    Fishbones
    ( AddressID,
```

```
    RelatedTransportationFeatureID,
    Geometry
)
SELECT
    a.AddressID,
    b.RelatedTransportationFeatureID,
    ST_Makeline( a.Geometry, b.Geometry)
FROM
    AddressPtCollection a
        INNER JOIN GeocodedPtZeroOffset b
            ON a.AddressID = b.AddressID
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

Many anomalous fishbones are most easily located visually. Those should be added to your FishboneAnomalies table.

Create a table to hold the potential anomalies

```
CREATE TABLE FishboneAnomalies
(
    id SERIAL PRIMARY KEY,
    AddressID TEXT,
    AddressNumber INTEGER,
    CompleteStreetName TEXT,
    Anomaly Text
)
```

Collect addresses without fishbones

```
INSERT INTO FishboneAnomalies
(
    AddressID,
    AddressNumber,
    CompleteStreetName,
    Anomaly
)
SELECT
    a.AddressID,
    a.AddressNumber,
    a.CompleteStreetName,
    'No fishbone'::TEXT as "Anomaly"
FROM
    AddressPtCollection a
        LEFT JOIN Fishbones b
            ON a.AddressID = b.AddressID
WHERE
    b.AddressID is null
```

Collect addresses with fishbones that touch other fishbones

Run this query for each fishbone.

```
INSERT INTO FishboneAnomalies
```

```
(  
    AddressID,  
    AddressNumber,  
    CompleteStreetName,  
    Anomaly  
)  
SELECT  
    a.AddressID,  
    a.AddressNumber,  
    a.CompleteStreetName,  
    'Fishbone touches'::TEXT as "Anomaly"  
FROM  
    Fishbones a  
    INNER JOIN fishbones b  
        ON TOUCHES( a.Geometry, b.AddressID )  
WHERE  
    a.AddressID = [ __fill in AddressID value__ ]
```

Collect addresses with fishbones that cross centerlines

```
INSERT INTO FishboneAnomalies  
(  
    AddressID,  
    AddressNumber,  
    CompleteStreetName,  
    Anomaly  
)  
SELECT  
    a.AddressID,  
    a.AddressNumber,  
    a.CompleteStreetName,  
    'Fishbone touches'::TEXT as "Anomaly"  
FROM  
    Fishbones a  
    INNER JOIN StCenterlineCollection b  
        ON CROSSES( a.Geometry, b.StCenterlineGeometry )
```

Collect addresses with long fishbones

```
INSERT INTO FishboneAnomalies  
(  
    AddressID,  
    AddressNumber,  
    CompleteStreetName,  
    Anomaly  
)  
SELECT  
    AddressID,  
    AddressNumber,  
    CompleteStreetName,  
    'Long fishbone'::TEXT as "Anomaly"  
FROM  
    Fishbones  
WHERE  
    ST_Length( Geometry ) >= 1000
```

Collect addresses with suspected bowtie fishbones

```
INSERT INTO FishboneAnomalies  
(
```

```
AddressID,  
AddressNumber,  
CompleteStreetName,  
Anomaly  
)  
SELECT  
    a.AddressID,  
    a.AddressNumber,  
    a.CompleteStreetName,  
    'Bowtie fishbone'::TEXT as "Anomaly"  
FROM  
    Fishbones a  
    INNER JOIN  
        ( SELECT  
            st_startpoint( Geometry ) as Geometry  
            from  
            Fishbones  
            group by  
            st_startpoint( Geometry )  
            having  
            count( st_startpoint( Geometry ) ) > 1  
        ) as b  
        on st_startpoint( a.Geometry ) = b.Geometry  
;
```

Count of non-conforming records

After examining your results in the FishboneAnomalies and discarding those that were identified in error, count the number of non-conforming records.

```
SELECT  
    COUNT(*)  
FROM  
    FishboneAnomalies  
count_of_total_records  
SELECT  
    COUNT(*)  
FROM  
    AddressPtCollection
```

Result Report Example

Tested AddressNumberFishbonesMeasure at 80% conformance.

4.5.5 AddressNumberParityMeasure

Measure Name

AddressNumberParityMeasure

Measure Description

Test agreement of the odd/even status of the numeric value of an address number with the Address Number Parity attribute. The arithmetic listed in the pseudocode substitutes for a modulo operator(%) that may be unfamiliar, and is not always available. An alternate WHERE clause with a modulo is:

```
WHERE  
( ( AddressNumber % 2 ) = 1
```

```

        AND
        AddressNumberParity = 'even'
    )
OR
( ( AddressNumber % 2 ) = 0
    AND
    AddressNumberParity = 'odd'
)

```

Report

Logical Consistency

Evaluation Procedure

Compare the odd/even status of the numeric value of an address number with the Address Number Parity attribute.

Spatial Data Required

None

Code Example: Testing Records

```

SELECT
    AddressID,
    AddressNumber
FROM
    AddressPtCollection
WHERE
    ( AddressNumber - ( ( AddressNumber / 2 ) * 2 ) ) = 0
        AND
        AddressNumberParity = 'odd'
    )
OR
( AddressNumber - ( ( AddressNumber / 2 ) * 2 ) ) = 1
    AND
    AddressNumberParity = 'even'
)

```

Code Example: Testing the Conformance of a Data Set**Function**

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```

SELECT
    COUNT( AddressID )
FROM
    AddressPtCollection
WHERE
    ( AddressNumber - ( ( AddressNumber / 2 ) * 2 ) ) = 0
        AND
        AddressNumberParity = 'odd'
    )
OR
( AddressNumber - ( ( AddressNumber / 2 ) * 2 ) ) = 1
    AND
    AddressNumberParity = 'even'
)

```

```
        AddressNumberParity = 'even'  
    )  
count_of_total_records  
  
SELECT  
    COUNT( * )  
FROM  
    AddressPtCollection
```

Result Report Example

Tested AddressNumberParityMeasure at 92% conformance.

4.5.6 AddressNumberRangeCompletenessMeasure

Measure Name

AddressNumberRangeCompletenessMeasure

Measure Description

Check for a low and high value in each Two Number Address Range or Four Number Address Range pair. This test assumes that you are checking ranges for which ranges should be complete in order to conform with the Address Reference System.

Systems that use addresses, such as Computer Aided Dispatch (CAD), or any given Address Reference System may have requirements regarding null or zero numbers on ranges.

Report

Logical Consistency

Evaluation Procedure

Check for a non-zero value for both low and high each range.

Spatial Data Required

None. Although the query references the StCenterlineCollection it does not use geometry. The StCenterlineGeometry field need not be populated to use the measure.

Pseudocode Example: Testing records

Query

The query below is identical for features using either Two Number Address Range or Four Number Address Range.

- One range type must be used consistently throughout the query.
- When using Four Number Address Range each side must be checked independently, and remain constant throughout the query.
- Fill in the appropriate field names for range values where you see Range.Low or Range.High.
- Fill in the name of the primary key field for the ranges where you see Range.

```
SELECT  
    AddressTransportationFeatureID,
```

```
Range.Low,  
Range.High  
FROM  
    StCenterlineCollection  
WHERE  
( Range.Low is null  
OR  
    Range.Low = 0  
)  
OR  
( Range.High is null  
OR  
    Range.High = 0  
)
```

Pseudocode Example: Checking the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_nonconforming_records

```
SELECT  
    count( * )  
FROM  
    StCenterlineCollection  
WHERE  
( Range.Low is null  
OR  
    Range.Low = 0  
)  
OR  
( Range.High is null  
OR  
    Range.High = 0  
)
```

count_of_total_records

```
SELECT  
    count( * )  
FROM  
    StCenterlineCollection
```

Result Report Example

Tested AddressNumberRangeCompletenessMeasure at 50% conformance.

4.5.7 AddressNumberRangeParityConsistencyMeasure

Measure Name

AddressNumberRangeParityConsistencyMeasure

Measure Description

Test agreement of the odd/even status of the numeric value of low and high address numbers. The arithmetic listed in the pseudocode substitutes for a modula operator(%)

that may be unfamiliar, and is not always available. Two versions of the query are listed, one using a modula and one without.

Report

Logical Consistency

Evaluation Procedure

Compare the odd/even status of the numeric value of each address number in a Two Number Address Range or one side of a Four Number Address Range.

Spatial Data Required

None.

Pseudocode Example: Testing records

Queries for this measure are identical for features using either Two Number Address Range or Four Number Address Range.

- One range type must be used consistently throughout the query.
- When using Four Number Address Range each side must be checked independently, and remain constant throughout the query.
- Fill in the appropriate field names for range values where you see Range.Low or Range.High.

Query using modula

```
SELECT
    AddressTransportationFeatureID,
    Range.Low,
    Range.High
FROM
    StCenterlineCollection
WHERE
    ( Range.Low % 2 ) != ( Range.High % 2 )
```

Query without modula

```
SELECT
    AddressTransportationFeatureID,
    Range.Low,
    Range.High
FROM
    StCenterlineCollection
WHERE
    ( Range.Low - ( truncate( Range.Low / 2 ) * 2 ) )
    !=
    ( Range.High - ( truncate( Range.High / 2 ) * 2 ) )
```

Example Results

- If the query does not return any records, there are no anomalies. Conformance is 100%
- Example results with anomalies

Range.ID	Range.Low	Range.High
27	2	99
1142	501	598

Pseudocode Example: Checking the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_nonconforming_records with modula

```
SELECT
    count(*)
FROM
    StCenterlineCollection
WHERE
    ( Range.Low % 2 ) != ( Range.High % 2 )
```

count_of_nonconforming_records without modula

```
SELECT
    count(*)
FROM
    StCenterlineCollection
WHERE
    ( Range.Low - ( truncate( Range.Low / 2 ) * 2 ) )
    !=
    ( Range.High - ( truncate( Range.High/ 2 ) * 2 ) )
```

count_of_total_records

```
SELECT
    count( * )
FROM
    StCenterlineCollection
```

Result Report Example

Tested AddressNumberRangeParityConsistencyMeasure at 90% consistency.

4.5.8 Address Range Directionality Measure

Measure Name

AddressRangeDirectionalityMeasure

Measure Description

This measure derives Address Range Directionality values, allowing update to and/or checks of values stored in the database. It requires that the thoroughfare to which the

address is relate be specifically identified. In the AddressPtCollection view this relationship is identified by the Related Transportation Feature ID. The Address Side Of Street information is also required.

The geometry chosen to represent the addresses determines the effectiveness of this test. In urban areas the distance from a building or other addressed feature to a street is short and spatial relationships simple. Rural areas with long driveways may find relative positions of addresses misrepresented, and therefore the directionality of the related street centerlines confused. In the latter case it may be helpful to use points describing access from the street to represent the addresses and determine Address Range Directionality.

Report

Logical Consistency

Evaluation Procedure

Determine the AddressRangeDirectionality value of each segment. Where there is a value recorded in the database, check it against the AddressRangeDirectionality as calculated.

Spatial Data Required

StCenterlineCollection, AddressPtCollection, and fishbones (see Address Number Fishbones Measure).

Code Example: Assembling Data from Views

Create a table for calculated AddressRangeDirectionality values

```
CREATE TABLE "AddressRangeDirectionalityTable"
(
    id serial primary key,
    "AddressID" integer,
    "AddressRangeDirectionality" text
)
;
```

Calculate AddressRangeDirectionality values

This query calculates the Address Range Directionality value of a single centerline segment. Insert the same Related Transportation Feature ID value in the three places indicated by [RelatedTransportationFeatureID value].

```
--  
-- Insert the results of the query into the table  
--  
INSERT INTO "AddressRangeDirectionality"  
(  
    "AddressID",  
    "AddressRangeDirectionality"  
)  
--  
-- Assemble the AddressRangeDirectionality phrase  
--  
SELECT  
    g."AddressTransportationFeatureID",  
    CASE  
        WHEN
```

```
        g.directionality_left = g.directionality_right
    THEN
        g.directionality_left
WHEN
        g.directionality_left is not null
        AND
        g.directionality_right is null
    THEN
        g.directionality_left
WHEN
        g.directionality_left is null
        AND
        g.directionality_right is not null
    THEN
        g.directionality_right
WHEN
        g.directionality_left is not null
        AND
        g.directionality_right is not null
        AND
        g.directionality_left != g.directionality_right
    THEN
        g.directionality_left || '-' || g.directionality_right
END as "AddressRangeDirectionality"
FROM
(
    --
    -- Calculate the orientation of each side of the line
    --
    SELECT
        f."AddressTransportationFeatureID",
        CASE
            WHEN
                e."LeftMinAddressNumber" IS NOT NULL
                AND
                e."LeftMaxAddressNumber" IS NOT NULL
                AND
                e."LeftMinAddressNumber" != e."LeftMaxAddressNumber"
                AND
                ( st_distance( st_startpoint( f."StCenterlineGeometry" ) ,
e."LeftMinAddressPtGeometry" )
                    <
                    st_distance( st_endpoint( f."StCenterlineGeometry" ) ,
e."LeftMaxAddressPtGeometry" )
                )
            THEN
                'with'
            WHEN
                e."LeftMinAddressNumber" IS NOT NULL
                AND
                e."LeftMaxAddressNumber" IS NOT NULL
                AND
                e."LeftMinAddressNumber" != e."LeftMaxAddressNumber"
                AND
                ( st_distance( st_startpoint( f."StCenterlineGeometry" ) ,
e."LeftMinAddressPtGeometry" )
                    >
```

```
        st_distance( st_endpoint( f."StCenterlineGeometry" ) ,
e."LeftMaxAddressPtGeometry" )
    )
THEN
    'against'
END as "directionality_left",
CASE
WHEN
    e."RightMinAddressNumber" IS NOT NULL
    AND
    e."RightMaxAddressNumber" IS NOT NULL
    AND
    e."RightMinAddressNumber" != e."RightMaxAddressNumber"
    AND
        ( st_distance( st_startpoint( f."StCenterlineGeometry" ) ,
e."RightMinAddressPtGeometry" )
    <
        st_distance( st_endpoint( f."StCenterlineGeometry" ) ,
e."RightMaxAddressPtGeometry" )
    )
THEN
    'with'
WHEN
    e."RightMinAddressNumber" IS NOT NULL
    AND
    e."RightMaxAddressNumber" IS NOT NULL
    AND
    e."RightMinAddressNumber" != e."RightMaxAddressNumber"
    AND
        ( st_distance( st_startpoint( f."StCenterlineGeometry" ) ,
e."RightMinAddressPtGeometry" )
    >
        st_distance( st_endpoint( f."StCenterlineGeometry" ) ,
e."RightMaxAddressPtGeometry" )
    )
THEN
    'against'
END as "directionality_right"
FROM
    "StCenterlineCollection" f
INNER JOIN
(
    --
    -- Match the selected addresses to point geometry
    --
SELECT
    bim."RelatedTransportationFeatureID",
    a."AddressID" as "LeftMinAddressID",
    bim."LeftMinAddressNumber",
    a."AddressPtGeometry" as "LeftMinAddressPtGeometry",
    b."AddressID" as "LeftMaxAddressID",
    bim."LeftMaxAddressNumber",
    b."AddressPtGeometry" as "LeftMaxAddressPtGeometry",
    c."AddressID" as "RightMinAddressID",
    bim."RightMinAddressNumber",
    c."AddressPtGeometry" as "RightMinAddressPtGeometry",
    d."AddressID" as "RightMaxAddressID",
```

```
bim."RightMaxAddressNumber",
d."AddressPtGeometry" as "RightMaxAddressPtGeometry"
FROM
(
-- Select the highest and lowest numbers on the left
and right side of the street
--
SELECT
    [ RelatedTransportationFeatureID value ] as
"RelatedTransportationFeatureID",
    min( foo."AddressNumber" ) as
"LeftMinAddressNumber",
    max( foo."AddressNumber" ) as
"LeftMaxAddressNumber",
    min( bar."AddressNumber" ) as
"RightMinAddressNumber",
    max( bar."AddressNumber" ) as
"RightMaxAddressNumber"
FROM
(
    SELECT
        "AddressNumber"
    FROM
        address."AddressPtCollection"
    WHERE
        "RelatedTransportationFeatureID" = [
RelatedTransportationFeatureID value ]
        AND
        "AddressSideOfStreet" = 'left'
) AS foo,
(
    SELECT
        "AddressNumber"
    FROM
        address."AddressPtCollection"
    WHERE
        "RelatedTransportationFeatureID" = [
RelatedTransportationFeatureID value ]
        AND
        "AddressSideOfStreet" = 'right'
) AS bar
) AS bim
INNER JOIN address."AddressPtCollection" a
ON ( bim."RelatedTransportationFeatureID" =
a."RelatedTransportationFeatureID"
        AND
        bim."LeftMinAddressNumber" =
a."AddressNumber"
)
INNER JOIN address."AddressPtCollection" b
ON ( bim."RelatedTransportationFeatureID" =
b."RelatedTransportationFeatureID"
        AND
        bim."LeftMaxAddressNumber" =
b."AddressNumber"
)
INNER JOIN address."AddressPtCollection" c
```

```
        ON ( bim."RelatedTransportationFeatureID" =
c."RelatedTransportationFeatureID"
          AND
          bim."RightMinAddressNumber" =
c."AddressNumber"
        )
      INNER JOIN address."AddressPtCollection" d
        ON ( bim."RelatedTransportationFeatureID" =
d."RelatedTransportationFeatureID"
          AND
          bim."RightMaxAddressNumber" =
d."AddressNumber"
        )
      ) AS e
      ON f."AddressTransportationFeatureID" =
e."RelatedTransportationFeatureID"
    ) AS g
;
```

Code Example: Testing records

This query tests previously stored Address Range Directionality values against information derived from the geometry. Values that have changed, or those that are not simply **with** may be anomalies.

```
SELECT
  a."RelatedTransportationFeatureID",
  a."AddressRangeDirectionality",
  b."AddressRangeDirectionality"
FROM
  "AddressRangeDirectionalityTable" a
  LEFT JOIN "PreviousAddressRangeDirectionalityTable" b
    ON a."RelatedTransportationFeatureID" =
b."RelatedTransportationFeatureID"
WHERE
  b."AddressRangeDirectionality" is null
  OR
  a."AddressRangeDirectionality" != b."AddressRangeDirectionality"
  OR
  a."AddressRangeDirectionality" != 'with'
```

Pseudocode Example: Checking the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_nonconforming_records

```
SELECT
  count(*)
FROM
  "AddressRangeDirectionalityTable" a
  LEFT JOIN "PreviousAddressRangeDirectionalityTable" b
    ON a."RelatedTransportationFeatureID" =
b."RelatedTransportationFeatureID"
WHERE
  b."AddressRangeDirectionality" IS NULL
```

```
OR
  a. "AddressRangeDirectionality" != b. "AddressRangeDirectionality"
    OR
      a. "AddressRangeDirectionality" != 'with'
count of total records

SELECT
  count( a.* )
FROM
  "StCenterlineCollection" a
  INNER JOIN ( SELECT DISTINCT
    "RelatedTransportationFeatureID"
    FROM
      "AddressPtCollection"
    ) AS b
  ON a."AddressTransportationFeatureID" =
b."RelatedTransportationFeatureID"
```

Result Report Example

Tested Address Range Directionality Measure at 94% conformance.

4.5.9 Address Reference System Axes Point Of Beginning Measure

Measure Name

AddressReferenceSystemAxesPointOfBeginningMeasure

Measure Description

This measure checks for a common point to describe the intersection of the Address Reference System Axis elements, and the location of the Address Reference System Axis Point Of Beginning against that common point. The measure query assumes that the data are stored topologically, so each axis is split where it intersects the others. It makes, however, no assumptions about the directionality of the axis lines themselves. The query returns TRUE results if the axes meet. Once a TRUE result is achieved the query may be altered to return the Address Reference System Axis Point Of Beginning if it does not already exist.

The query assumes 4 axes, identifiable as north, south, east and west. It can be altered for other kinds of Address Reference System Axis geometries.

Report

Logical Consistency

Evaluation Procedure

Make sure the axes meet at the Address Reference System Axis Point Of Beginning.

Spatial Data Required

Address Reference System Axis Point Of Beginning, Address Reference System Axis

Code Example: Testing Records

```
SELECT
CASE
  WHEN EQUALS( foo.x_origin, foo.y_origin ) = TRUE
```

```
        AND
        EQUALS( foo.x_origin,
AddressReferenceSystemAxisPointOfBeginning ) = TRUE
    THEN 'Conforms'
    ELSE 'Does not conform'
END as "Evaluation",
EQUALS( foo.x_origin, foo.y_origin ) as "axis_end_points",
EQUALS( foo.x_origin, AddressReferenceSystemAxisPointOfBeginning )
as "pob_check"
FROM
(
    SELECT
        CASE
            WHEN EQUALS( east.start, west.start ) THEN east.start
            WHEN EQUALS( east.start, west.end ) THEN east.start
            WHEN EQUALS( east.end, west.start ) THEN east.end
            WHEN EQUALS( east.end, west.end ) THEN east.end
        END AS "x_origin",
        CASE
            WHEN EQUALS( north.start, south.start ) THEN north.start
            WHEN EQUALS( north.start, south.end ) THEN north.start
            WHEN EQUALS( north.end, south.start ) THEN north.end
            WHEN EQUALS( north.end, south.end ) THEN north.end
        END AS "y_origin"
FROM
(
    SELECT
        ST_Startpoint( Geometry ) as "start"
        ST_Endpoint( Geometry ) as "end"
    FROM
        AddressReferenceSystemAxis
    WHERE
        Axis = 'North'
) as north,
(
    SELECT
        ST_Startpoint( Geometry ) as "start"
        ST_Endpoint( Geometry ) as "end"
    FROM
        AddressReferenceSystemAxis
    WHERE
        Axis = 'South'
) as south,
(
    SELECT
        ST_Startpoint( Geometry ) as "start"
        ST_Endpoint( Geometry ) as "end"
    FROM
        AddressReferenceSystemAxis
    WHERE
        Axis = 'East'
) as east,
(
    SELECT
        ST_Startpoint( Geometry ) as "start"
        ST_Endpoint( Geometry ) as "end"
    FROM
```

```
AddressReferenceSystemAxis
WHERE
    Axis = 'West'
) as west
) as foo
```

Testing the Conformance of a Data Set

This measure produces a result that conforms 100% or 0%, as noted in the query results.

Result Report Example

Tested AddressReferenceSystemAxesPointOfBeginningMeasure at 100% conformance.

4.5.10 Address Reference System Rules Measure

Measure Name

AddressReferenceSystemRulesMeasure

Measure Description

Address Reference System layers are essential for both address assignment and quality control, particularly in axial systems. The exact use is dependent on Address Reference System Rules and will be different for each locality. The example query given here describes checking one frequently used rule that the beginning Address Number values for each street are determined by the grid cell in which the start point of the street is located. Local Address Reference System Rules will shape the final query or queries used.

Report

Logical Consistency

Given the variability involved in testing it will be important to report the queries actually used along with the results.

Evaluation Procedure

For the example, examine each Two Number Address Range or Four Number Address Range for streets where the lowest range numbers are not within the ranges described for the corresponding grid cell.

Spatial Data Required

For the example, StCenterlineCollection with Two Number Address Range or Four Number Address Range values, and an Address Reference System layer are required. In the example below the Address Reference System layer has low values for east-west and north-south trending roads beginning within the area covered by each grid cell. For the purposes of this example, the east-west or north-south direction of each street segment is recorded in the database.

Pseudocode Example: Testing Records

```
SELECT DISTINCT ON ( Range.Low )
    a.CompleteStreetName,
    a.TransportationFeatureID,
    b.GridCellID
    a.Range.Low,
    b.EastWestLowRangeNumber,
```

```
b.NorthSouthLowRangeNumber ,  
CASE  
    WHEN ( a.Range.Low = b.EastWestLowRangeNumber  
        AND  
        a.GeometryDirection = 'east-west'  
    )  
    OR  
    ( a.Range.Low = b.NorthSouthLowRangeNumber  
        AND  
        a.GeometryDirection = 'north-south'  
    )  
    THEN 'ok'  
    ELSE 'anomaly'  
END AS "RangeAnomaly"  
FROM  
    StCenterlineCollection a  
    INNER JOIN AddressReferenceSystem b  
        ON INTERSECTS( St_Startpoint( a.Geometry ), b.Geometry )  
ORDER BY  
    a.Range.Low
```

Pseudocode Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT  
    COUNT(a.*)  
FROM  
    StCenterlineCollection a  
    INNER JOIN AddressReferenceSystem b  
        ON INTERSECTS( St_Startpoint( a.Geometry ), b.Geometry )  
WHERE  
    ( a.Range.Low != b.EastWestLowRangeNumber  
        AND  
        a.GeometryDirection = 'east-west'  
    )  
    OR  
    ( a.Range.Low != b.NorthSouthLowRangeNumber  
        AND  
        a.GeometryDirection = 'north-south'  
    )
```

count_of_total_records

```
SELECT  
    COUNT(*)  
FROM  
    StCenterlineCollection
```

Result Report Example

Tested AddressReferenceSystemRulesMeasure at 65% conformance.

Rule tested: [insert rule description here]

Query used: [list query here]

4.5.11 Check Attached Pairs Measure

Measure Name

CheckAttachedPairsMeasure

Measure Description

This measure describes how to check Attached Element attributes set to "attached" for matching values describing adjacent Complete Street Name or Complete Address Number components.

Report

Logical Consistency

Evaluation Procedure

Run the query for each Attached Element attribute. Attached Element attributes will be present or absent according to the needs of each locality. If the query is successful it will return an empty result set. Anomalies returned should be researched and corrected.

Spatial Data Required

None

Code Example: Testing Records

Attached Element may occur almost anywhere in the Complete Street Name or Complete Address Number elements. The query may be changed to check whichever pair of elements are affected.

```
SELECT
    AddressID
FROM
    AddressPtCollection
WHERE
(
    ( AddressNumberAttached IS NULL
    OR
        AddressNumberAttached = 'Not Attached'
    )
    AND
        CompleteAddressNumber ~ AddressNumber || AddressNumberSuffix
)
OR
(
    AddressNumberAttached = 'Attached'
    AND
        CompleteAddressNumber ~ AddressNumber || ' ' || |
AddressNumberSuffix
)
;
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( * )
FROM
    AddressPtCollection
WHERE
(
    (
        ( AddressNumberAttached IS NULL
        OR
        AddressNumberAttached = 'Not Attached'
        )
    AND
    CompleteAddressNumber ~ AddressNumber || AddressNumberSuffix
)
OR
(
    AddressNumberAttached = 'Attached'
    AND
    CompleteAddressNumber ~ AddressNumber || ' ' || AddressNumberSuffix
)
;
count_of_total_records
```

```
SELECT
    COUNT( * )
FROM
    AddressPtCollection
```

Result Report Example

Tested Check Attached Pairs Measure at 94% conformance.

4.5.12 Complex Element Sequence Number Measure

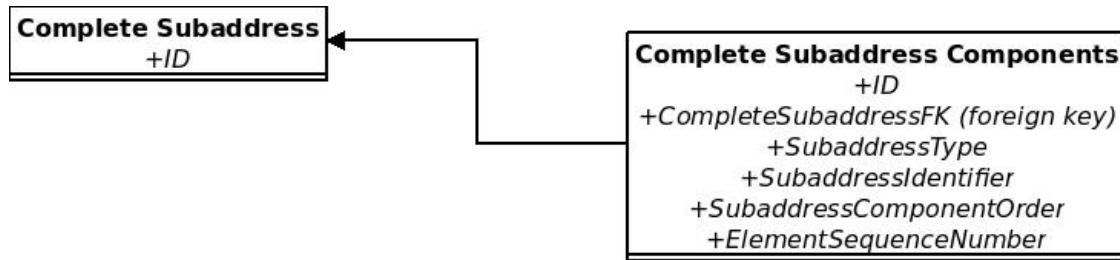
Measure Name

CompleteElementSequenceNumberMeasure

Measure Description

This measure requires assembling a complex element in order by Element Sequence Number, and testing it for completeness of the elements. The function described here is an example: the details will vary by system. It includes a function that can be used to assemble a complete complex element by sequence number. The example given is for Complete Subaddress elements, but can be applied to any series of elements ordered by an Element Sequence Number.

The example function works on a table structure for the Complete Subaddress complex element, described below.



Report

Attribute (Thematic) Accuracy

Evaluation Procedure

Check measure results for missing strings. Some localities may have a protocol for the order in which elements of a complete complex element appear. While the various types of combinations are beyond the scope of the standard, they should be considered in a local quality program.

Spatial Data Required

None.

Code Example: Testing Records

Function

```
CREATE OR REPLACE FUNCTION AssembleSubaddressString( int ) RETURNS text
AS
$BODY$
DECLARE
    id alias for $1;
    csa CompleteSubaddressComponents%rowtype;
    CompleteSubaddress text;
BEGIN
    FOR csa IN
        SELECT
            *
        FROM
            CompleteSubaddressComponents
        WHERE
            CompleteSubaddressFk = id
        ORDER BY
            element_seq
    LOOP
        IF ElementSequenceNumber = 1
            AND
            ( SubaddressComponentOrder = 1
            OR
            Subaddress Component Order = 3
            )
        THEN
            Complete Subaddress := SubaddressType || ' ' || SubaddressIdentifier;
        ELSIF ElementSequenceNumber = 1
            AND
            SubaddressComponentOrder = 2
        THEN
```

```
CompleteSubaddress := SubaddressIdentifier || ' ' ||  
SubaddressType;  
ELSIF ElementSequenceNumber > 1  
    AND  
        ( SubaddressComponentOrder = 1  
        OR  
            SubaddressComponentOrder = 3  
        )  
THEN  
    CompleteSubaddress := CompleteSubaddress || ', ' ||  
SubaddressType || ' ' || SubaddressIdentifier ;  
ELSIF ElementSequenceNumber > 1  
    AND  
        SubaddressComponentOrder = 2  
THEN  
    CompleteSubaddress := CompleteSubaddress || ', ' ||  
SubaddressIdentifier || ' ' || SubaddressType ;  
END IF;  
END LOOP;  
RETURN Complete Subaddress;  
END  
$BODY$  
;
```

Query

```
SELECT DISTINCT  
    b.CompleteSubaddressFk, AssembleSubaddressString(  
b.CompleteSubaddressFk )  
FROM  
    CompleteSubaddress a  
    LEFT JOIN Subaddress b  
        ON a.PrimaryKey = b.CompleteSubaddress  
WHERE  
    AssembleSubaddressString( b.CompleteSubaddressFk ) IS NULL  
    OR  
    b.CompleteSubaddressFk IS NULL
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT DISTINCT  
    b.CompleteSubaddressFk,  
    AssembleSubaddressString( b.CompleteSubaddressFk )  
FROM  
    CompleteSubaddress a  
    LEFT JOIN Subaddress b  
        ON a.PrimaryKey = b.CompleteSubaddressFk  
WHERE  
    AssembleSubaddressString( b.CompleteSubaddressFk ) IS NULL  
    OR  
    b.CompleteSubaddressFk IS NULL  
;
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    CompleteSubaddress
```

Result Report Example

Tested Complex Element Sequence Number Measure at 93% conformance.

4.5.13 Data Type Measure

Measure Name

DataTypeMeasure

Measure Description

This measure uses pattern matching to test for data types. It is common for delimited text files to arrive with fields that appear to be one data type or another, but may have isolated anomalies buried somewhere in the file. In this case the data are frequently loaded to a staging table with all the fields defined as TEXT. Data types need to be evaluated before loading the data into a comprehensive database. For example, this standard defines the Address Number element as integer. This technique helps to locate and resolve types that don't match. Different database systems offer functions to replace one value with another given user-defined conditions.

Data types for ASCII values can also be checked by trying to load them to a relational table. Data that do not conform to a given field definition should fail to load. This method, however, leaves anomaly resolution to other systems. Using the staging table method allows for the data to be manipulated within the system where it will be permanently deployed, while allowing the original text file to remain in its original state. History and repeatability can be maintained by saving any queries required to alter values.

Patterns are given here for integer and numeric values, as they are most often the data types that cause data loading failures. Other patterns may be added as necessary.

Report

Logical Consistency

Evaluation Procedure

Test each column in the address collection for its data type. Any elements that do not agree with the specified data type are anomalies.

Spatial Data Required

None

Code Example: Testing Records

```
SELECT
    COUNT( value_type ) ,
    value_type
FROM
    (
        SELECT
            CASE
```

```
WHEN COALESCE( TRIM( value::TEXT ) ) ~ '^[0-9]*$'
THEN 'integer'
WHEN COALESCE( TRIM( value::TEXT ) ) ~ '^[0-9]*.[0-9]{1,}$
THEN 'numeric'
ELSE 'other'
END AS value_type
FROM
    table
WHERE
    value::TEXT ~ '[A-Za-z0-9]'
) AS foo
GROUP BY
    value_type
HAVING
    value_type != [fill in required type]
;
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( value_type ),
    value_type
FROM
    (
        SELECT
            CASE
                WHEN COALESCE( TRIM( value::TEXT ) ) ~ '^[0-9]*$'
                THEN 'integer'
                WHEN COALESCE( TRIM( value::TEXT ) ) ~ '^[0-9]*.[0-9]{1,}$
                THEN 'numeric'
                ELSE 'other'
            END AS value_type
        FROM
            Table
        WHERE
            value::TEXT ~ '[A-Za-z0-9]'
    ) AS foo
GROUP BY
    value_type
HAVING
    value_type != [fill in required type]
;
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    Table
```

Result Report Example

Tested DataTypeMeasure on Table.value with 98% conformance.

4.5.14 Delivery Address Type Subaddress Measure

Measure Name

DeliveryAddressTypeSubaddressMeasure

Measure Description

This measure checks for null Complete Subaddress values where the Delivery Address Type indicates their presence, and Complete Subaddress values where the Delivery Address Type indicates otherwise.

Report

Logical consistency

Evaluation Procedure

Check measure query results for inconsistencies.

Spatial Data Required

None

Code Example: Testing Records

Note that the query below combines the AddressPtCollection with the tables described in the Complex Element Sequence Number Measure.

```
SELECT
    a.AddressID,
    a.DeliveryAddressType,
    b.id as CompleteSubaddressForeignKey
FROM
    AddressPtCollection a
        LEFT JOIN CompleteSubaddress b
            ON a.AddressID = b.AddressID
WHERE
    ( DeliveryAddressType = 'Subaddress Included'
        AND
        b.id IS NULL
    )
    OR
    ( DeliveryAddressType = 'Subaddress Excluded'
        AND
        b.id IS NOT NULL
    )
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( a.* )
FROM
    AddressPtCollection a
```

```

        LEFT JOIN CompleteSubaddress b
        ON a.AddressID = b.AddressID
    WHERE
        ( DeliveryAddressType = 'Subaddress Included'
        AND
        b.id IS NULL
    )
    OR
        ( DeliveryAddressType = 'Subaddress Excluded'
        AND
        b.id IS NOT NULL
    )
count_of_total_records

SELECT
    COUNT( * )
FROM
    AddressPtCollection

```

Result Report Example

Tested DeliveryAddressTypeSubaddressMeasure at 98% conformance.

4.5.15 Duplicate Street Name Measure

Measure Name

DuplicateStreetNameMeasure

Measure Description

In many Address Reference Systems distantly disconnected street segments with the same names constitute an anomaly. This query returns Address Transportation Feature ID values for the ends of all disconnected segments. These will most often include results where the disconnected segments are close enough to mitigate the anomaly. T

The function as written is a skeleton. Local customizations typically include:

- A length test for the segments to exclude centerlines bordering traffic islands
- Using identifiers for Complete Street Name values rather than text strings
- Adding a test to make sure the disconnected street names are within the same jurisdiction

Regardless of customization, there will almost certainly be false positives. The final percentage of conformance should be calculated after a final set of street centerlines with duplicate street names has been finalized.

Report

Logical Consistency.

Evaluation Procedure

Examine the segments included in the results by Complete Street Name, along with the entire set of segments with the same Complete Street Name from all the street segments within the Address Reference System Extent. Take appropriate action where duplicate street names constitute a threat to public safety.

Spatial Data Required

StCenterlineCollection, Address Reference System Extent and Nodes and StreetsNodes as described in About Nodes For Quality Control.

Code Example: Testing Records

Function

```
CREATE OR REPLACE FUNCTION too_many_ends( text )
RETURNS boolean as $$

DECLARE
    this_street alias for $1;
    chk_dup boolean;
BEGIN

SELECT INTO chk_dup
CASE
    WHEN COUNT( bim.CompleteStreetName ) > 2 THEN TRUE
    ELSE FALSE
END AS "check_for_duplicate_names"
FROM
(
    SELECT DISTINCT
        bar.nodesfk,
        a.CompleteStreetName,
        a.RelatedTransportationFeatureID
    FROM
        StreetsNodes a
        INNER JOIN StCenterlineCollection b
            on a.RelatedTransportationFeatureID =
b.AddressTransportationFeatureID
        INNER JOIN
        (
            SELECT
                foo.nodesfk
            FROM
                ( SELECT
                    nodesfk
                FROM
                    StreetsNodes
                WHERE
                    CompleteStreetName = this_street
                ) as foo
            GROUP BY
                foo.nodesfk
            HAVING
                COUNT( nodesfk ) = 1
        ) as bar
        ON a.nodesfk = bar.nodesfk
    ) as bim
WHERE
    bim.CompleteStreetName = this_street
GROUP BY
    bim.CompleteStreetName
;

RETURN chk_dup;
```

END

```
$$ language 'plpgsql';
```

Query

```
SELECT DISTINCT
    a.RelatedTransportationFeatureID,
    a.CompleteStreetName
FROM
    StreetsNodes a
    INNER JOIN
        ( SELECT DISTINCT
            CompleteStreetName
        FROM
            StreetsNodes
        ) b
    on a.CompleteStreetName = b.CompleteStreetName
where
    too_many_ends( a.CompleteStreetName ) = TRUE
;
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( DISTINCT a.RelatedTransportationFeatureID )
FROM
    StreetsNodes a
    INNER JOIN
        ( SELECT DISTINCT
            CompleteStreetName
        FROM
            StreetsNodes
        ) b
    on a.CompleteStreetName = b.CompleteStreetName
WHERE
    too_many_ends( a.CompleteStreetName ) = TRUE
```

count_of_total_records

```
SELECT
    COUNT( AddressTransportationFeatureID )
FROM
    StCenterlineCollection
```

Result Report Example

Tested Duplicate Street Name Measure at 97% conformance.

Local changes to the measure include: [descriptions of customizations].

4.5.16 Element Sequence Number Measure

Measure Name

ElementSequenceNumberMeasure

Measure Description

Element Sequence Number values must begin at 1 and increment by 1. This measure generates a sequence of integers and checks the Element Sequence Number values against them.

This example uses the same tables described for Complex Element Sequence Number Measure, but can be used for any complex element using Element Sequence Number values. The nextval construct is used as an implementation of the SQL standard NEXT VALUE FOR.

Report

Attribute (Thematic) Accuracy

Evaluation Procedure

Examine Element Sequence Number values for sequences identified by the query.

Spatial Data Required

None.

Code Example: Testing Records

Function

```
CREATE FUNCTION test_element_sequence_numbers( integer ) RETURNS
integer AS
$BODY$

DECLARE
    SubaddressID alias for $1;
    AnomalySequence integer;

BEGIN

CREATE TEMPORARY SEQUENCE TemporarySequence;

SELECT INTO AnomalySequence
    foo.CompleteSubaddressFk
FROM
    ( SELECT
        CompleteSubaddressFk,
        NEXTVAL( TemporarySequence ) as TestSequenceNumber ,
        ElementSequenceNumber
    FROM
        CompleteSubaddressComponents
    WHERE
        CompleteSubaddressFk = SubaddressID
    ) as foo
WHERE
```

```
    foo.ElementSequenceNumber != TestSequenceNumber
;
```

```
DROP SEQUENCE TemporarySequence;
```

```
RETURN ( AnomalySequence );
```

```
END
```

```
$BODY$  
language 'plpgsql';
```

Query

```
SELECT
    test_element_sequence_numbers( CompleteSubaddressFk ) ,
    ElementSequenceNumber
FROM
    CompleteSubaddressComponents
WHERE
    test_element_sequence_numbers( CompleteSubaddressFk ) is not null
ORDER BY
    test_element_sequence_numbers( CompleteSubaddressFk ) ,
    ElementSequenceNumber
;
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( DISTINCT CompleteSubaddressFk )
FROM
    CompleteSubaddressComponents
WHERE
    test_element_sequence_numbers( CompleteSubaddressFk ) is not
null
ORDER BY
    test_element_sequence_numbers( CompleteSubaddressFk ) ,
    ElementSequenceNumber
;
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    CompleteSubaddress
```

Result Report Example

Tested Element Sequence Number Measure at 100% conformance.

4.5.17 Future Date Measure

Measure Name

FutureDateMeasure

Measure Description

This measure produces a list of dates that are in the future.

Report

Temporal Accuracy, Attribute (Thematic) Accuracy

Evaluation Procedure

Check dates.

Spatial Data Required

None

Code Example: Testing Records

```
SELECT
    AddressID,
    AddressStartDate,
    AddressEndDate
FROM
    AddressPtCollection
WHERE
    AddressStartDate > now()
    OR
    AddressEndDate > now()
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( * )
FROM
    AddressPtCollection
WHERE
    AddressStartDate > now()
    OR
    AddressEndDate > now()
```

count_of_total_records

```
SELECT
    COUNT( AddressID )
FROM
    AddressPtCollection
```

Result Report Example

Tested Future Date Measure at 100% conformance.

4.5.18 Intersection Validity Measure

Measure Name

IntersectionValidityMeasure

Measure Description

Check intersection addresses for streets that do not intersect in geometry.

Report

Logical Consistency

Evaluation Procedure

Check for intersection of the geometry.

Spatial Data Required

StCenterlineCollection, Nodes

Code Example: Testing Records

Prepare Data

Intersection addresses frequently arrive as undifferentiated strings. It is helpful to separate the Complete Street Name elements in these strings in order to check them against the geometry. The exact methods for doing this will vary across database platforms.

Create a staging table

Create a staging table with a primary key (ID) and a field for the intersection strings. It will look something like this:

```
CREATE TABLE IntersectionAddress
(
    id SERIAL PRIMARY KEY,
    IntersectionAddress text
);
```

Fill the staging table

Fill the table with your strings. Let the primary key increment automatically to create the intersection identifiers. The completed table will look something like this:

id	IntersectionAddress
1	Boardwalk and Park Place
2	Hollywood Boulevard and Vine Street
3	West Street & Main Street
4	P Street && 19th Street && Mill Road
5	Avenida Rosa y Calle 19
6	Memorial Park, Last Chance Gulch and Memorial Drive
7	Phoenix Village, Scovill Avenue and East 59th Street

Create a table for intersection address components

Create a new table for the strings to be broken into separate Complete Street Name elements. Use a foreign key from the first table to link each Complete Street Name element to its corresponding intersection.

```
CREATE TABLE IntersectionParsed
```

```
(  
    id SERIAL PRIMARY KEY,  
    IntersectionAddressFk INTEGER REFERENCES IntersectionAddress,  
    CompleteStreetName text  
) ;
```

Fill the new table with intersection address components

This step requires parsing the intersection addresses, and pairing each Complete Street Name value with its primary key (id) from the Intersection Address table. The resulting pairs of values are inserted into the IntersectionParsed table.

For example, this record in Intersection Address

```
id | IntersectionAddress  
---+-----  
 3 | West Street & Main Street
```

results in these values inserted to IntersectionParsed:

```
IntersectionAddressFk | CompleteStreetName  
-----+-----  
      3           | West Street  
      3           | Main Street
```

Methods vary from system to system. One example is:

```
INSERT INTO  
    IntersectionParsed( IntersectionAddressFk, CompleteStreetName )  
SELECT  
    id,  
    TRIM( BOTH regexp_split_to_table( IntersectionAddress,  
' , |and|&&|&|y' ))  
FROM  
    IntersectionAddress
```

Check results

The results should look something like this.

```
id | IntersectionAddressFk | CompleteStreetName  
---+-----+-----  
 1 |      1          | Boardwalk  
 2 |      1          | Park Place  
 3 |      2          | Hollywood Boulevard  
 4 |      2          | Vine Street  
 5 |      3          | West Street  
 6 |      3          | Main Street  
 7 |      4          | P Street  
 8 |      4          | 19th Street  
 9 |      4          | Mill Road  
10 |     5          | Avenida Rosa  
11 |     5          | Calle 19  
12 |     6          | Memorial Park  
13 |     6          | Last Chance Gulch  
14 |     6          | Memorial Drive  
15 |     7          | Phoenix Village  
16 |     7          | Scovill Avenue  
17 |     7          | East 59th Street
```

Create a view

This view matches intersection addresses with intersecting roads using the Complete Street Name values.

```
CREATE VIEW IntersectionAddressMatch
AS
--
-- Join the node data with the intersection addresses on
-- the CompleteStreetName values and the count of CompleteStreetName
-- values found for each intersection address and each node
--
SELECT
    bam.CountNodesfk,
    bim.CountIntersectionAddressFk,
    bam.Nodesfk,
    bim.IntersectionAddressFk,
    bim.CompleteStreetName,
    a.IntersectionAddress
FROM
(
    --
    -- List the NodesFk foreign key,
    -- the count of CompleteStreetName values and
    -- each CompleteStreetName meeting at the node
    --
    SELECT DISTINCT
        bar.NodesFk,
        bar.CountNodesFk,
        a.CompleteStreetName
    FROM
    (
        --
        -- Count the number of street names
        -- associated with the node
        --
        SELECT
            foo.NodesFk,
            COUNT( foo.NodesFk ) as CountNodesFk
        FROM
        (
            --
            -- Select the identifier for the intersection geometry
            -- ( nodes ) and the CompleteStreetName values for
            -- thoroughfares meeting at that point
            --
            SELECT DISTINCT
                NodesFk,
                CompleteStreetName
            from
                StreetsNodes
            ) as foo
        GROUP BY
            foo.NodesFk
    ) as bar
    INNER JOIN StreetsNodes a
        ON bar.NodesFk = a.NodesFk
```

```
) as bam
INNER JOIN
(
  --
  -- List the IntersectionAddressFk foreign key,
  -- the count of CompleteStreetName values and
  -- each CompleteStreetName for the intersection
  -- addresses.
  --
  SELECT DISTINCT
    bar.IntersectionAddressFk,
    bar.CountIntersectionAddressFk,
    a.CompleteStreetName
  FROM
  (
    --
    -- Count the number of street names in the
    -- intersection address
    --
    SELECT
      foo.IntersectionAddressFk,
      COUNT( foo.IntersectionAddressFk ) as
CountIntersectionAddressFk
  FROM
  (
    --
    -- Select the street names and intersection address
    -- identifiers for addresses to match
    --
    SELECT DISTINCT
      IntersectionAddressFk,
      CompleteStreetName
    FROM
      IntersectionParsed
  ) as foo
  GROUP BY
    foo.IntersectionAddressFk
) as bar
  INNER JOIN IntersectionParsed a
    ON bar.IntersectionAddressFk =
a.IntersectionAddressFk
  ) as bim
  ON bam.CountNodesFk = bim.CountIntersectionAddressFk
  AND
    bam.CompleteStreetName = bim.CompleteStreetName
INNER JOIN IntersectionAddress a
  ON bim.IntersectionAddressFk = a.id
ORDER BY
  bim.IntersectionAddressFk,
  bim.CompleteStreetName
;
```

Query for anomalies

```
SELECT
  a.IntersectionAddressFk,
  a.CompleteStreetName,
  c.IntersectionAddress
```

```
FROM
    IntersectionParsed a
        LEFT JOIN IntersectionAddressMatch b
            ON a.IntersectionAddressFk = b.IntersectionAddressFk
                AND
                    a.completestreetname = b.completestreetname
        INNER JOIN intersectionaddress c
            ON a.intersectionaddressfk = c.id
WHERE
    b.completestreetname IS NULL
;
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( DISTINCT a.IntersectionAddressFk )
FROM
    IntersectionParsed a
        LEFT JOIN IntersectionAddressMatch b
            ON a.IntersectionAddressFk = b.IntersectionAddressFk
                AND
                    a.completestreetname = b.completestreetname
        INNER JOIN intersectionaddress c
            ON a.intersectionaddressfk = c.id
WHERE
    b.completestreetname IS NULL
;
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    IntersectionAddress
```

Result Report Example

Tested Intersection Validity Measure at 75% conformance.

4.5.19 Left Right Odd Even Parity Measure

Measure Name

LeftRightOddEvenParityMeasure

Measure Description

This measure tests the association of odd and even values in each Two Number Address Range or Four Number Address Range with the left and right side of the thoroughfare.

Report

Logical Consistency

Evaluation Procedure

Check the odd/even status of the numeric value of each address number for consistency with the established local rule for associating address

Code Example: Testing Records

The query below assumes even addresses on the left and odd on the right side of the street.

Query: local rule is even on left, odd on right

```
SELECT
    a.AddressID
from
    AddressPtCollection a
        INNER JOIN StCenterlineCollection b
            ON a.RelatedTransportationFeatureID =
b.TransportationFeatureID
WHERE
    a.AddressNumber BETWEEN b.Range.Low AND b.Range.High
    AND
    a.CompleteStreetName = b.CompleteStreetName
    AND
    ( ( a.AddressNumberParity = 'odd'
        AND
        a.AddressSideOfStreet = 'left'
    )
    OR
    ( a.AddressNumberParity = 'even'
        AND
        a.AddressSideOfStreet = 'right'
    )
)
```

Query: local rule is odd on left, even on right

```
SELECT
    a.AddressID
from
    AddressPtCollection a
        INNER JOIN StCenterlineCollection b
            ON a.RelatedTransportationFeatureID =
b.TransportationFeatureID
WHERE
    a.AddressNumber BETWEEN b.Range.Low AND b.Range.High
    AND
    a.CompleteStreetName = b.CompleteStreetName
    AND
    ( ( a.AddressNumberParity = 'even'
        AND
        a.AddressSideOfStreet = 'left'
    )
    OR
    ( a.AddressNumberParity = 'odd'
        AND
        a.AddressSideOfStreet = 'right'
    )
)
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

- o local rule is even on left, odd on right

```
SELECT
    COUNT( a.AddressID )
  from
    AddressPtCollection a
    INNER JOIN StCenterlineCollection b
      ON a.RelatedTransportationFeatureID =
b.TransportationFeatureID
  WHERE
    a.AddressNumber BETWEEN b.Range.Low AND b.Range.High
    AND
    a.CompleteStreetName = b.CompleteStreetName
    AND
    ( ( a.AddressNumberParity = 'odd'
        AND
        a.AddressSideOfStreet = 'left'
      )
    OR
    ( a.AddressNumberParity = 'even'
        AND
        a.AddressSideOfStreet = 'right'
      )
    )
```

- o local rule is odd on left, even on right

```
SELECT
    COUNT( a.AddressID )
  from
    AddressPtCollection a
    INNER JOIN StCenterlineCollection b
      ON a.RelatedTransportationFeatureID =
b.TransportationFeatureID
  WHERE
    a.AddressNumber BETWEEN b.Range.Low AND b.Range.High
    AND
    a.CompleteStreetName = b.CompleteStreetName
    AND
    ( ( a.AddressNumberParity = 'even'
        AND
        a.AddressSideOfStreet = 'left'
      )
    OR
    ( a.AddressNumberParity = 'odd'
        AND
        a.AddressSideOfStreet = 'right'
      )
    )
```

count_of_total_records

```
SELECT
  COUNT( * )
FROM
  AddressPtCollection
```

Result Report Example

Tested Left Right Odd Even Parity Measure at 75% conformance.

4.5.20 Location Description Field Check Measure

Measure Name

LocationDescriptionFieldCheckMeasure

Measure Description

This measure describes checking the location description in the field.

Report

Attribute Accuracy

Evaluation Procedure

Use the Location Description to navigate to the address, checking for discrepancies between the description and ground conditions. It can Note that additional information such as the date the Location Description was collected or last validated and/or the name of the people who collected or entered it can reinforce the lineage of the address.

Spatial Data Required

No digital spatial data are required.

Result Report Example

Tested LocationDescriptionFieldCheckMeasure at 68% conformance.

4.5.21 Low High Address Sequence Measure

Measure Name

LowHighAddressSequenceMeasure

Measure Description

This measure confirms that the value of the low address is less than or equal to the high address in a range assigned to a street segment.

Report

Logical Consistency

Evaluation Procedure

Check the values for each range.

Spatial Data Required

None. Attributes listed in StCenterlineCollection are included in the query.

Pseudocode Example: Testing Records

```
SELECT
    AddressTransportationFeatureID
FROM
    StCenterlineCollection
WHERE
    Range.Low > Range.High
```

Pseudocode Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( * )
FROM
    StCenterlineCollection
WHERE
    Range.Low > Range.High
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    StCenterlineCollection
```

Result Report Example

Tested Low High Address Sequence Measure at 50% conformance.

4.5.22 Official Status Address Authority Consistency Measure

Measure Name

OfficialStatusAddressAuthorityConsistencyMeasure

Measure Description

This measure tests logical agreement of the Official Status with the Address Authority.

Report

Logical Consistency

Evaluation Procedure

Use TabularDomainMeasure to validate Official Status entries against the domain. Check logical agreement between the status values and the business process.

Spatial Data Required

None. Attributes listed in AddressPtCollection are included in the query.

Code Example: Testing Records

```
SELECT
    AddressID
```

```
FROM
    AddressPtCollection
WHERE
    ( AddressAuthority IS NULL
    AND
    (
        OfficialStatus = 'Official'
        OR
        OfficialStatus = 'Official Alternate or Alias'
        OR
        OfficialStatus = 'Alternate Established by an Official Renaming
Action of the Address Authority'
        OR
        OfficialStatus = 'Alternates Established by an Address
Authority'
    )
)
OR
( AddressAuthority IS NOT NULL
AND
(
    OfficialStatus = 'Unofficial Alternate or Alias'
    OR
    OfficialStatus = 'Alternate Established by Colloquial Use'
    OR
    OfficialStatus = 'Unofficial Alternate in Frequent Use'
    OR
    OfficialStatus = 'Unofficial Alternate Names In Use by an Agency
or Entity'
    OR
    OfficialStatus = 'Posted or Vanity Address'
    OR
    OfficialStatus = 'Verified Invalid'
)
)
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    AddressID
FROM
    AddressPtCollection
WHERE
    ( AddressAuthority IS NULL
    AND
    (
        OfficialStatus = 'Official'
        OR
        OfficialStatus = 'Official Alternate or Alias'
        OR
        OfficialStatus = 'Unofficial Alternate or Alias'
        OR
        OfficialStatus = 'Alternate Established by Colloquial Use'
        OR
        OfficialStatus = 'Unofficial Alternate in Frequent Use'
        OR
        OfficialStatus = 'Unofficial Alternate Names In Use by an Agency
or Entity'
        OR
        OfficialStatus = 'Posted or Vanity Address'
        OR
        OfficialStatus = 'Verified Invalid'
    )
)
```

```
    OfficialStatus = 'Alternate Established by an Official
Renaming Action of the Address Authority'
    OR
    OfficialStatus = 'Alternates Established by an Address
Authority'
)
)
OR
( AddressAuthority IS NOT NULL
AND
(
    OfficialStatus = 'Unofficial Alternate or Alias'
    OR
    OfficialStatus = 'Alternate Established by Colloquial Use'
    OR
    OfficialStatus = 'Unofficial Alternate in Frequent Use'
    OR
    OfficialStatus = 'Unofficial Alternate Names In Use by an
Agency or Entity'
    OR
    OfficialStatus = 'Posted or Vanity Address'
    OR
    OfficialStatus = 'Verified Invalid'
)
)
)
count_of_total_records

SELECT
    COUNT( * )
FROM
    AddressPtCollection
```

Result Report Example

Tested Official Status Address Authority Consistency Measure at 85% conformance.

4.5.23 Overlapping Ranges Measure

Measure Name

OverlappingRangesMeasure

Measure Description

This measure checks the sequence of numbers where one non-zero Two Number Address Range or Four Number Address Range meets another. The example shown describes the direction of the segment geometry going from the low Address Number to the high Address Number. Where the direction of the geometry varies, the query will have to be altered accordingly. In cases where segment directionality may vary it is extremely helpful to describe that directionality in the database.

Report

Logical Consistency

Evaluation Procedure

Check ranges on each side of a common point.

Spatial Data Required

StreetsNodes, StCenterlineCollection

Pseudocode Example: Testing Records

The query should be run for each street name in the database. The example uses Main Street for illustration. It may be helpful to use identifiers instead of text to identify street names.

```
SELECT
    a.Nodesfk,
    b.SegmentEnd,
    b.RelatedTransportationFeatureID,
    c.Range.Low
    c.Range.High
    d.SegmentEnd,
    d.RelatedTransportationFeatureID,
    e.Range.Low
    e.Range.High
FROM
(
    SELECT
        Nodesfk
    FROM
        StreetsNodes
    WHERE
        CompleteStreetName = 'Main Street'
    GROUP BY
        Nodesfk
    HAVING
        COUNT( Nodesfk ) > 1
) as a
INNER JOIN StreetsNodes b
    ON a.Nodesfk = b.Nodesfk
INNER JOIN StCenterlineCollection c
    on b.RelatedTransportationFeatureID = c.TransportationFeatureID
INNER JOIN StreetsNodes d
    ON a.Nodesfk = d.Nodesfk
INNER JOIN StCenterlineCollection e
    on d.RelatedTransportationFeatureID = e.TransportationFeatureID
WHERE
    b.SegmentEnd = 'end'
    AND
    d.SegmentEnd = 'start'
    AND
    c.CompleteStreetName = 'Main Street'
    AND
    e.CompleteStreetName = 'Main Street'
    and
    c.Range.High > e.Range.Low
ORDER BY
    a.Nodesfk
;
```

Pseudocode Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    count( a.Nodesfk )
FROM
(
    SELECT
        Nodesfk
    FROM
        StreetsNodes
    WHERE
        CompleteStreetName = 'Main Street'
    GROUP BY
        Nodesfk
    HAVING
        COUNT( Nodesfk ) > 1
) as a
INNER JOIN StreetsNodes b
    ON a.Nodesfk = b.Nodesfk
INNER JOIN StCenterlineCollection c
    on b.RelatedTransportationFeatureID =
c.TransportationFeatureID
    INNER JOIN StreetsNodes d
        ON a.Nodesfk = d.Nodesfk
    INNER JOIN StCenterlineCollection e
        on d.RelatedTransportationFeatureID =
e.TransportationFeatureID
    WHERE
        b.SegmentEnd = 'end'
        AND
        d.SegmentEnd = 'start'
        AND
        c.CompleteStreetName = 'Main Street'
        AND
        e.CompleteStreetName = 'Main Street'
        and
        c.Range.High > e.Range.Low
ORDER BY
    a.Nodesfk
;
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    Nodes
```

Result Report Example

Tested OverlappingRangesMeasure at 90% consistency.

4.5.24 Pattern Sequence Measure

Measure Name

PatternSequenceMeasure

Measure Description

This measure tests the sequence of values in each complex element for conformance to the pattern for the complex element. The query produces a list of complex elements in the address collection that do not match a sequence of simple elements. For those complex elements ordered by an Element Sequence Number please refer to ComplexElementSequenceNumberMeasure.

Complex elements called "Complete" lend themselves to normalized database tables, so that each simple element value is recorded only once. Once the text comprising a complex element has been split up into a number of tables, this test identifies database entries that have come to differ from the original data.

Some typical uses include:

- Checking a concatenated version of parsed Complete Street Name values against the original, unparsed data
- Checking a parsed Numbered Thoroughfare Address against the original, unparsed data
- Checking any concatenated Address Data Classification against original, unclassified data

Report

Logical Consistency

Evaluation Procedure

Check each complex element value against the original data for completeness.

Spatial Data Required

None.

Pseudocode Example: Testing Records

Due to the wide applicability of this measure the exact data sets are not specified, even as views.

```
SELECT
    a.ComplexElement As disagreeWithSequence
FROM
    AddressDatabase a
    LEFT JOIN OriginalData b
        ON a.ComplexElement != b.OriginalDataString
WHERE
    b.OriginalDataString IS NULL
```

Pseudocode Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( a.ComplexElement )
FROM
    AddressDatabase a
    LEFT JOIN OriginalData b
        ON a.ComplexElement != b.OriginalDataString
WHERE
    b.OriginalDataString IS NULL
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    AddressDatabase
```

Result Report Example

Tested [list address elements] against [original data title] using Pattern Sequence Measure at 88% conformance.

4.5.25 Range Domain Measure

Measure Name

RangeDomainMeasure

Measure Description

This measure tests each Address Number for agreement with ranges. Address Number Fishbones Measure is frequently used to establish the Related Transportation Feature ID value for AddressPtCollection.

Report

Logical Consistency

Evaluation Procedure

Validate Address Number values against low and high range values.

Spatial Data Required

None. Attribute values from AddressPtCollection and StCenterlineCollection are included in the query.

Pseudocode Example: Testing Records

```
SELECT
    a.AddressID,
    a.RelatedTransportationFeatureID,
    a.AddressNumber,
    b.Range.Low,
    b.Range.High
FROM
    AddressPtCollection a
    INNER JOIN StCenterlineCollection b
```

```
ON a.RelatedTransportationFeatureID =
b.TransportationFeatureID
WHERE
    NOT( a.AddressNumber BETWEEN b.Range.Low AND b.Range.High )
```

Pseudocode Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( a.AddressID )
FROM
    AddressPtCollection a
    INNER JOIN StCenterlineCollection b
        ON a.RelatedTransportationFeatureID =
b.TransportationFeatureID
WHERE
    NOT( a.AddressNumber BETWEEN b.Range.Low AND b.Range.High )
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    AddressPtCollection
```

Result Report Example

Tested RangeDomainMeasure at 70% conformance.

4.5.26 Related Element Uniqueness Measure

Measure Name

RelatedElementUniquenessMeasure

Measure Description

This measure checks the uniqueness of the values related to a given element, in either the same table or a related table. For example, you might check the uniqueness of Complete Address Number values along a given Complete Street Name. The example query illustrates this use of the measure, checking the uniqueness of address numbers along Main Street. Customized versions of the same query can be used to check a wide range of data.

Report

Logical Consistency

Evaluation Procedure

Review records associated with inconsistent values in the related table.

Spatial Data Required

None

Code Example: Testing Records

The example code below tests a single primary value, in this case the Complete Street Name. It should be repeated for all the unique primary values in a data set to test the uniqueness of the related values. The query below can be restated as a function or stored procedure for convenience.

```
SELECT
    a.AddressID
    a.CompleteAddressNumber,
    a.CompleteStreetName
FROM
    AddressPtCollection a
    INNER JOIN
    (
        SELECT
            CompleteAddressNumber
        FROM
            ( SELECT DISTINCT
                CompleteStreetName,
                CompleteAddressNumber
            FROM
                AddressPtCollection
            WHERE
                CompleteStreetName = 'Main Street'
            ) AS foo
        GROUP BY
            CompleteAddressNumber
        HAVING
            COUNT( CompleteAddressNumber ) > 1
    ) AS bar
ON
    a.CompleteAddressNumber = bar.CompleteAddressNumber
WHERE
    a.CompleteStreetName = 'Main Street'
;
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

The count of conforming records, like the testing query, should be run for all the primary values tested. It may be restated as a function or stored procedure for convenience.

count_of_conforming_records

```
SELECT
    COUNT( * )
FROM
    AddressPtCollection a
    INNER JOIN
    (
        SELECT
            CompleteAddressNumber
        FROM
```

```
( SELECT DISTINCT
      CompleteStreetName,
      CompleteAddressNumber
    FROM
      AddressPtCollection
    WHERE
      CompleteStreetName = 'Main Street'
    ) AS foo
  GROUP BY
    CompleteAddressNumber
  HAVING
    COUNT( CompleteAddressNumber ) > 1
  ) AS bar
ON
  a.CompleteAddressNumber = bar.CompleteAddressNumber
WHERE
  a.CompleteStreetName = 'Main Street'
;
count_of_total_records

SELECT
  COUNT( * )
FROM
  AddressPtCollection
;
```

Result Report Query

Tested [table].[column] primary values to find unique related values in [table].[column] at 88% conformance.

4.5.27 Related Element Value Measure

Measure Name

Related Element Value Measure

Measure Description

This measure checks the logical consistency of data related to another part of the address. These may be values in a single table, or values referenced through a foreign key. There are two ways to use this concept:

- **Compare authoritative data values against those in use.** In this case, by definition, those values that do not conform to the authoritative data values are anomalies.

Example

Comparing ZIP code values published by the United States Postal Service against those in the AddressPtCollection and StCenterlineCollection

- **Compare two related values that each conform to the same domain and have a relationship that indicates that the values will be the same.** In this case, either value could be anomalous, or both could be correct.

Example

Comparing Complete Street Name values between AddressPtCollection and StCenterlineCollection where the address point is associated with the centerline, as in

the example query given below. Where the values conflict either may be anomalous, or both may be correct. The latter case could result when a thoroughfare has a both state highway number and a local name. It may be customary to call the street by the state highway number, while some or all addresses may have been assigned using the local name: Highway 41 vs. Main Street.

- **Check related values where one is dependent on the other.**

Example

Comparing Street Name Pre Type and Street Name Post Type entries against functional classifications of the named road where specific types are associated with particular functional classes.

Report

Logical Consistency

Evaluation Procedure

Check for inconsistent values, appropriate to the nature of the specific query.

Code Example: Checking Related Element Values

The example query checks Complete Street Name values in addresses against the Complete Street Name values on the streets associated with those addresses. This is simply an illustration. The measure is intended to check related values of any kind, either in the same table or a related table.

```
SELECT
    a.AddressID,
    a.CompleteStreetName,
    b.CompleteStreetName
FROM
    AddressPtCollection a
        left join StCenterlineCollection b
            on a.RelatedTransportationFeatureID =
b.AddressTransportationFeatureID
WHERE
    a.CompleteStreetName != b.CompleteStreetName
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query

Function Parameters

count_of_nonconforming_records

```
SELECT
    a.AddressID,
    a.CompleteStreetName,
    b.CompleteStreetName
FROM
    AddressPtCollection a
        left join StCenterlineCollection b
            on a.RelatedTransportationFeatureID =
b.AddressTransportationFeatureID
```

```
WHERE
    a.CompleteStreetName != b.CompleteStreetName
count_of_total_records

SELECT
    count(*)
FROM
    AddressPtCollection
;
```

Result Report Example

Tested [Table.Column] against [Table.Column] using Related Element Value Measure at 72% conformance.

4.5.28 Related Not Null Measure

Measure Name

RelatedNotNullMeasure

Measure Description

This measure checks the completeness of data related to another part of the address. These may be values in a single table, or values referenced through a foreign key. For example:

- Addresses in a given jurisdiction that require Street Name Post Directional quadrants
- Elements of Numbered Thoroughfare Address table stored in related tables. Street Name Post Type values stored in a related table, for instance.

Report

Completeness

Evaluation Procedure

Check for invalid null values.

Spatial Data Required

None

Pseudocode Example: Testing Records

```
SELECT
    a.AddressID,
    a.RelatedDataIdentifier
FROM
    AddressDatabaseTable a
    LEFT JOIN RelatedTable b
        ON a.RelatedDataIdentifier = b.Identifier
WHERE
    b.Identifier is null
```

Pseudocode Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( AddressID )
FROM
    AddressDatabaseTable a
    LEFT JOIN RelatedTable b
        ON a.RelatedDataIdentifier = b.Identifier
WHERE
    b.Identifier is null
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    AddressDatabaseTable
```

Result Report Example

Tested [AddressDatabaseTable.Column] against [RelatedTable.Column] using Related Not Null Measure at 90% conformance.

4.5.29 Segment Directionality Consistency Measure

Measure Name

SegmentDirectionalityConsistencyMeasure

Measure Description

Check consistency of street segment directionality, which affects the use of Two Number Address Range and Four Number Address Range values. The test checks for segments with the same street name where more than one "from" or "to" ends meet at the same node.

Report

Logical Consistency

Evaluation Procedure

Examine segments where the measure indicates inconsistent directionality and take appropriate action. Depending on the use, that may mean reversing the directionality of inconsistent segments or making note in the database.

Spatial Data Required

Nodes and Streets Nodes as described in About Nodes For Quality Control

Code Example: Testing Records

```
SELECT
    a.NodesFk,
    a.CompleteStreetName,
    a.SegmentEnd,
    a.RelatedTransportationFeatureID,
    b.RelatedTransportationFeatureID
FROM
    StreetsNodes a
    INNER JOIN StreetsNodes b
```

```

    ON a.CompleteStreetName = b.CompleteStreetName
    AND
    a.NodesFk = b.NodesFk
WHERE
    a.RelatedTransportationFeatureId < b.RelatedTransportationFeatureId
    AND
    a.SegmentEnd = b.SegmentEnd
ORDER BY
    a.Nodesfk
;

```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```

SELECT
    COUNT( a.NodesFk )
FROM
    StreetsNodes a
        INNER JOIN StreetsNodes b
            ON a.CompleteStreetName = b.CompleteStreetName
            AND
            a.NodesFk = b.NodesFk
WHERE
    a.RelatedTransportationFeatureId <
b.RelatedTransportationFeatureId
    AND
    a.SegmentEnd = b.SegmentEnd
count_of_total_records

```

```

SELECT
    COUNT( RelatedTransportationFeatureID )
FROM
    StCenterlineCollection

```

Result Report Example

Tested SegmentDirectionalityConsistencyMeasure at 50% conformance.

4.5.30 Spatial Domain Measure

Measure Name

SpatialDomainMeasure

Measure Description

This measure tests values of some simple elements constrained by domains based on spatial domains: ZIP codes, PLSS descriptions, etc. This is limited to domains that are identified by the simple element alone. Address numbers, for example, cannot be tested against centerline ranges because the street name is only identified in a complex element. The query produces a list of simple elements in the address collection that do not conform to a spatial domain.

Report

Positional Accuracy

Evaluation Procedure

Check addresses outside the spatial domain.

Spatial Data Required

Address Pt Collection or St Centerline Collection, spatial domain geometry

Pseudocode Example: Testing Records

Note that the example uses AddressPtCollection. It can be altered to check on elements and attributes of StCenterlineCollection also.

```
SELECT
    a.AddressID
FROM
    AddressPtCollection a
        LEFT JOIN SpatialDomain b
            ON a.[column to test] = b.[corresponding column]
WHERE
    NOT( INTERSECTS( a.AddressPtGeometry, b.SpatialDomainGeometry ) )
```

Pseudocode Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    COUNT( * )
FROM
    AddressPtCollection a
        LEFT JOIN SpatialDomain b
            ON a.[column to test] = b.[corresponding column]
WHERE
    NOT( INTERSECTS( a.AddressPtGeometry, b.SpatialDomainGeometry ) )
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    AddressPtCollection
```

Result Report Example

Tested [field name] in [AddressPtCollection or StCenterlineCollection] using Spatial Domain Measure at 87% conformance.

4.5.31 Start End Date Order Measure

Measure Name

StartEndDateOrderMeasure

Measure Description

Test the logical ordering of the start and end dates.

Report

Temporal Accuracy, Attribute (Thematic) Accuracy

Evaluation Procedure

Check dates for records where the Address Start Date and Address End Date are out of order.

Spatial Data Required

None.

Code Example: Testing Records

```
SELECT
    AddressStartDate,
    AddressEndDate
FROM
    AddressPtCollection
WHERE
    AddressEndDate IS NOT NULL
    AND
        ( AddressStartDate > AddressEndDate
        OR
        AddressStartDate IS NULL
    )
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    AddressStartDate,
    AddressEndDate
FROM
    AddressPtCollection
WHERE
    AddressEndDate IS NOT NULL
    AND
        ( AddressStartDate > AddressEndDate
        OR
        AddressStartDate IS NULL
    )
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    AddressPtCollection
```

Result Report Example

Tested Start End Date Order Measure at 100% conformance.

4.5.32 Subaddress Component Order Measure

Measure Name

SubaddressComponentOrderMeasure

Measure Description

This measure tests Subaddress Elements against the component parts in the order specified by the Subaddress Component Order element.

Report

Attribute (Thematic) Accuracy

Evaluation Procedure

Check complex element against concatenated simple elements for anomalies.

Spatial Data Required

None

Pseudocode Example: Testing Records

```
SELECT
    SubaddressElement,
    SubaddressType,
    SubaddressIdentifier,
    SubaddressComponentOrder
FROM
    Subaddress Collection
WHERE
    (
        ( SubaddressElement = SubaddressType || ' ' || SubaddressIdentifier
        or
        ( SubaddressElement = SubaddressIdentifier and SubaddressType
is null )
        )
        and
        SubaddressComponentOrder = 2
    )
    or
    ( SubaddressElement = SubaddressIdentifier || ' ' || SubaddressType
        and
        SubaddressComponentOrder = 1
    )
;
```

Pseudocode Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_nonconforming_records

```
SELECT
    Count( * )
FROM
    Subaddress Collection
WHERE
(
    ( SubaddressElement = SubaddressType || ' ' || SubaddressIdentifier
        or
        ( SubaddressElement = SubaddressIdentifier
            and
            SubaddressType is null
        )
    )
    and
    SubaddressComponentOrder = 2
)
or
( SubaddressElement = SubaddressIdentifier || ' ' || SubaddressType
    and
    SubaddressComponentOrder = 1
)
;
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    Subaddress Collection
;
```

Result Report Example

Tested SubaddressComponentOrderMeasure at 96% conformance.

4.5.33 Tabular Domain Measure

Measure Name

TabularDomainMeasure

Measure Description

This measure tests each value for a simple element for agreement with the corresponding tabular domain. The query produces a list of simple elements in the address collection that do not conform to a domain.

Report

Attribute (Thematic) Accuracy

Evaluation Procedure

Investigate values that do not match the domain. They may include aliases, new values for the domain and/or simple mistakes.

Spatial Data Required

None.

Pseudocode Example: Testing Records

```
SELECT
    a.SimpleElement As disagreeWithDomain
FROM
    AddressPtCollection a
    LEFT JOIN Domain b
        ON a.SimpleElement = b.DomainValue
WHERE
    b.DomainValue IS NULL
;
```

Pseudocode Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    a.SimpleElement As disagreeWithDomain
FROM
    Address Collection a
    LEFT JOIN Domain b
        ON a.SimpleElement = b.DomainValue
WHERE
    b.DomainValue IS NULL
;
```

count_of_total_records

```
SELECT
    COUNT( a.SimpleElement )
FROM
    Address Collection
```

Result Report Example

Test [table name].[column name] using TabularDomainMeasure at 80% conformance.

4.5.34 Uniqueness Measure

Measure Name

UniquenessMeasure

Measure Description

This measure tests the uniqueness of a simple or complex value.

Report

Attribute (Thematic) Accuracy

Evaluation Procedure

Investigate cases where two or more values exist where a single value is expected. This is often used to check the "Domain" tables before they are used in TabularDomainMeasure: tables with unique values for individual street name components, for example.

Spatial Data Required

None.

Pseudocode Example: Testing Records

```
SELECT
    COUNT(Element), Element
FROM
    Address Collection
GROUP BY
    Element
HAVING
    COUNT(Element) > 1
```

Pseudocode Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_non_conforming_records

```
SELECT
    SUM( foo.NumberPerElement )
FROM
(
    SELECT
        COUNT( Element ) as NumberPerElement
    FROM
        Address Collection
    GROUP BY
        Element
    HAVING
        COUNT( Element ) > 1
) as foo
```

count_of_total_records

```
SELECT
    COUNT( Element )
FROM
    Address Collection
```

Result Report Example

Tested [table name].[column name] using UniquenessMeasure at 100% conformance.

4.5.35 USNG Coordinate Spatial Measure

Measure Name

USNGCoordinateSpatialMeasure

Measure Description

This measure tests the agreement between the location of the addressed object and the area described by the US National Grid Coordinate. This test derives the USNG for a point geometry and compares it to the USNG coordinate.

Report

Positional accuracy

Spatial Data Required

If the derived USNG matches the recorded USNG the comparison is successful. The coord2usng function is an example. Exact code may vary across systems. An inverse function, converting USNG to UTM coordinates, is provided for convenience in an **Addendum** section.

Code Example: Testing Records

Function

```
create or replace function coord2usng( numeric, numeric, numeric,
numeric, integer )
returns varchar as '

declare
    utm_x alias for $1;
    utm_y alias for $2;
    dd_long alias for $3;
    dd_lat alias for $4;
    precision alias for $5;
    utm_zone integer;
    gzd_alpha char(1);
    set integer;
    e100k_grp1 varchar[8];
    e100k_grp2 varchar[8];
    e100k_grp3 varchar[8];
    n100k_grp1 varchar[20];
    n100k_grp2 varchar[20];
    e_100k integer;
    n_100k integer;
    x_alpha_gsz char(1);
    y_alpha_gsz char(1);
    usng varchar;
    x_grid_coord varchar;
    y_grid_coord varchar;
    num integer;
begin

--find utm zone
select into utm_zone
case
    when dd_long between -180 and -174 then 1
    when dd_long between -174 and -168 then 2
    when dd_long between -168 and -162 then 3
    when dd_long between -162 and -156 then 4
    when dd_long between -156 and -150 then 5
    when dd_long between -150 and -144 then 6
end case;
```

```
when dd_long between -144 and -138 then 7
when dd_long between -138 and -132 then 8
when dd_long between -132 and -126 then 9
when dd_long between -126 and -120 then 10
when dd_long between -120 and -114 then 11
when dd_long between -114 and -108 then 12
when dd_long between -108 and -102 then 13
when dd_long between -102 and -96 then 14
when dd_long between -96 and -90 then 15
when dd_long between -90 and -84 then 16
when dd_long between -84 and -78 then 17
when dd_long between -78 and -72 then 18
when dd_long between -72 and -66 then 19
when dd_long between -66 and -60 then 20
when dd_long between -60 and -54 then 21
when dd_long between -54 and -48 then 22
when dd_long between -48 and -42 then 23
when dd_long between -42 and -36 then 24
when dd_long between -36 and -30 then 25
when dd_long between -30 and -24 then 26
when dd_long between -24 and -18 then 27
when dd_long between -18 and -12 then 28
when dd_long between -12 and -6 then 29
when dd_long between -6 and 0 then 30
when dd_long between 0 and 6 then 31
when dd_long between 6 and 12 then 32
when dd_long between 12 and 18 then 33
when dd_long between 18 and 24 then 34
when dd_long between 24 and 30 then 35
when dd_long between 30 and 36 then 36
when dd_long between 36 and 42 then 37
when dd_long between 42 and 48 then 38
when dd_long between 48 and 54 then 39
when dd_long between 54 and 60 then 40
when dd_long between 60 and 66 then 41
when dd_long between 66 and 72 then 42
when dd_long between 72 and 77 then 43
when dd_long between 78 and 84 then 44
when dd_long between 84 and 90 then 45
when dd_long between 90 and 96 then 46
when dd_long between 96 and 102 then 47
when dd_long between 102 and 108 then 48
when dd_long between 108 and 114 then 49
when dd_long between 114 and 120 then 50
when dd_long between 120 and 126 then 51
when dd_long between 126 and 132 then 52
when dd_long between 132 and 138 then 53
when dd_long between 138 and 144 then 54
when dd_long between 144 and 150 then 55
when dd_long between 150 and 156 then 56
when dd_long between 156 and 162 then 57
when dd_long between 162 and 168 then 58
when dd_long between 168 and 174 then 59
when dd_long between 174 and 180 then 60
end;
-- find grid zone character
```

```
select into gzd_alpha
case
    when dd_lat between -80 and -72 then ''C''
    when dd_lat between -72 and -64 then ''D''
    when dd_lat between -64 and -56 then ''E''
    when dd_lat between -56 and -48 then ''F''
    when dd_lat between -48 and -40 then ''G''
    when dd_lat between -40 and -32 then ''H''
    when dd_lat between -32 and -24 then ''J''
    when dd_lat between -24 and -16 then ''K''
    when dd_lat between -16 and -8 then ''L''
    when dd_lat between -8 and 0 then ''M''
    when dd_lat between 0 and 8 then ''N''
    when dd_lat between 8 and 16 then ''P''
    when dd_lat between 16 and 24 then ''Q''
    when dd_lat between 24 and 32 then ''R''
    when dd_lat between 32 and 40 then ''S''
    when dd_lat between 40 and 48 then ''T''
    when dd_lat between 48 and 56 then ''U''
    when dd_lat between 56 and 64 then ''V''
    when dd_lat between 64 and 72 then ''W''
    when dd_lat between 72 and 84 then ''X''
end;

-- derive set
if ( utm_zone <= 6 ) then
    set := utm_zone;
else
    if ( utm_zone % 6 = 0 ) then
        set := 6;
    else
        set := utm_zone % 6;
    end if;
end if;

-- construct arrays describing grid zone squares
select into e100k_grp1
array[''A'', ''B'', ''C'', ''D'', ''E'', ''F'', ''G'', ''H''];
select into e100k_grp2
array[''J'', ''K'', ''L'', ''M'', ''N'', ''P'', ''Q'', ''R''];
select into e100k_grp3
array[''S'', ''T'', ''U'', ''V'', ''W'', ''X'', ''Y'', ''Z''];
select into n100k_grp1
array[''A'', ''B'', ''C'', ''D'', ''E'', ''F'', ''G'', ''H'', ''J'', ''K'', ''L'',
      ''M'', ''N'', ''P'', ''Q'', ''R'', ''S'', ''T'', ''U'', ''V''];
select into n100k_grp2
array[''F'', ''G'', ''H'', ''J'', ''K'', ''L'', ''M'', ''N'', ''P'', ''Q'', ''R'',
      ''S'', ''T'', ''U'', ''V'', ''A'', ''B'', ''C'', ''D'', ''E''];

-- get the digit for the 100K places ( easting and northing )

select into e_100k
substring( utm_x::text from ( length( trunc( utm_x )::text ) - 5 )
for 1 );

n_100k = ( floor( utm_y / 100000 ) % 20 ) + 1;
```

```
-- get the grid

select into x_alpha_gsz
case
when ( set = 1 or set = 4 ) then e100k_grp1[e_100k]
when ( set = 2 or set = 5 ) then e100k_grp2[e_100k]
when ( set = 3 or set = 6 ) then e100k_grp3[e_100k]
end;

select into y_alpha_gsz
case
when ( set = 1 or set = 3 or set = 5 ) then n100k_grp1[n_100k]
when ( set = 2 or set = 4 or set = 6 ) then n100k_grp2[n_100k]
end;

-- get coordinates

select into x_grid_coord
case
when ( precision = 10000 ) then
    substring( utm_x::text from ( length( trunc( utm_x )::text ) -
4 ) for 1 )
when ( precision = 1000 ) then
    substring( utm_x::text from ( length( trunc( utm_x )::text ) -
4 ) for 2 )
when ( precision = 100 ) then
    substring( utm_x::text from ( length( trunc( utm_x )::text ) -
4 ) for 3 )
when ( precision = 10 ) then
    substring( utm_x::text from ( length( trunc( utm_x )::text ) -
4 ) for 4 )
when ( precision = 1 ) then
    substring( utm_x::text from ( length( trunc( utm_x )::text ) -
4 ) for 5 )
end;

select into y_grid_coord
case
when ( precision = 10000 ) then
    substring( utm_y::text from ( length( trunc( utm_y )::text ) -
4 ) for 1 )
when ( precision = 1000 ) then
    substring( utm_y::text from ( length( trunc( utm_y )::text ) -
4 ) for 2 )
when ( precision = 100 ) then
    substring( utm_y::text from ( length( trunc( utm_y )::text ) -
4 ) for 3 )
when ( precision = 10 ) then
    substring( utm_y::text from ( length( trunc( utm_y )::text ) -
4 ) for 4 )
when ( precision = 1 ) then
    substring( utm_y::text from ( length( trunc( utm_y )::text ) -
4 ) for 5 )
end;

-- assemble the USNG value
```

```
    usng := utm_zone || gzd_alpha || x_alpha_gsz || y_alpha_gsz ||  
x_grid_coord || y_grid_coord;
```

```
    return( usng );
```

```
end;
```

```
' language 'plpgsql';
```

Query

```
SELECT  
      USNationalGridCoordinate  
FROM  
      AddressPtCollection  
WHERE  
      coord2usng  
      ( st_x( st_transform( c.geom, 26916 ) )::numeric,  
        st_y( st_transform( c.geom, 26916 ) )::numeric,  
        st_x( st_transform( c.geom, 4269 ) )::numeric,  
        st_y( st_transform( c.geom, 4269 ) )::numeric,  
        1 )  
      != USNationalGridCoordinate  
;
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the sample query.

Function Parameters

count_of_nonconforming_records

```
SELECT  
      COUNT( * )  
FROM  
      AddressPtCollection  
WHERE  
      coord2usng  
      ( st_x( st_transform( c.geom, 26916 ) )::numeric,  
        st_y( st_transform( c.geom, 26916 ) )::numeric,  
        st_x( st_transform( c.geom, 4269 ) )::numeric,  
        st_y( st_transform( c.geom, 4269 ) )::numeric,  
        1 )  
      != USNationalGridCoordinate  
;
```

count_of_total_records

```
SELECT  
      COUNT( * )  
FROM  
      AddressPtCollection
```

Result Report Example

Tested USNGCoordinateMeasure at 96% conformance.

Addendum

Note

This function returns a pair of coordinates at the center of the area described by the precision of the USNG grid reference.

Function

```
create or replace function usng2coord( text )
returns text as $$

declare
    usng alias for $1;
    zone integer;
    grid_zone text;
    set integer;
    offset_north numeric;
    x_alpha_gsz text;
    y_alpha_gsz text;
    e_coord integer;
    n_coord integer;
    e100k integer;
    n100k integer;
    e100k_grp1 text[];
    e100k_grp2 text[];
    e100k_grp3 text[];
    n100k_grp1 text[];
    n100k_grp2 text[];
    e_gsz integer;
    n_gsz integer;
    grid numeric;
    precision numeric;
    e_grid integer;
    n_grid integer;
    usng_coords varchar;
    xmin numeric;
    ymin numeric;

begin

    -- parse UTM zone
    select into zone cast( ( substring( usng from '^[[[:digit:]]*' ) ) as
integer );

    -- derive set
    if ( zone <= 6 ) then
        set := zone;
    else
        if ( zone % 6 = 0 ) then
            set := 6;
        else
            set := zone % 6;
        end if;
    end if;
```

```
-- parse grid zone

select into grid_zone substring( usng from ( length(zone::text) + 1
) for 1 );

-- parse grid zone squares
select into x_alpha_gsz substring( usng from ( length( zone::text ) +
2 ) for 1 );
select into y_alpha_gsz substring( usng from ( length( zone::text ) +
3 ) for 1 );

-- calculate offset_north

select into offset_north
case
    when ( grid_zone = 'N' or grid_zone = 'P' )
        then 0
    when ( grid_zone = 'Q' and ( set % 2 ) = 1 and y_alpha_gsz <= 'K'
)
        then 2000000
    when ( grid_zone = 'Q' and ( set % 2 ) = 1 and y_alpha_gsz >= 'L'
)
        then 0
    when ( grid_zone = 'Q' and ( set % 2 ) = 0 and y_alpha_gsz >= 'F'
and y_alpha_gsz <= 'Q' )
        then 2000000
    when ( grid_zone = 'Q' and ( set % 2 ) = 0 and ( y_alpha_gsz <=
'E' or y_alpha_gsz >= 'R' ) )
        then 0
    when ( grid_zone = 'R' )
        then 2000000
    when ( grid_zone = 'S' and ( set % 2 ) = 1 and y_alpha_gsz <= 'K'
)
        then 4000000
    when ( grid_zone = 'S' and ( set % 2 ) = 1 and y_alpha_gsz >= 'L'
)
        then 2000000
    when ( grid_zone = 'S' and ( set % 2 ) = 0 and y_alpha_gsz >= 'F'
and y_alpha_gsz <= 'Q' )
        then 4000000
    when ( grid_zone = 'S' and ( set % 2 ) = 0 and ( y_alpha_gsz <=
'E' or y_alpha_gsz >= 'R' ) )
        then 2000000
    when ( grid_zone = 'T' )
        then 4000000
    when ( grid_zone = 'U' and ( set % 2 ) = 1 and y_alpha_gsz <= 'C'
)
        then 6000000
    when ( grid_zone = 'U' and ( set % 2 ) = 1 and y_alpha_gsz >= 'D'
)
        then 4000000
    when ( grid_zone = 'U' and ( set % 2 ) = 0 and y_alpha_gsz >= 'F'
and y_alpha_gsz <= 'H' )
        then 6000000
    when ( grid_zone = 'U' and ( set % 2 ) = 0 and ( y_alpha_gsz <=
'E' or y_alpha_gsz >= 'J' ) )
        then 0
```

```
        then 4000000
when ( grid_zone = 'V' or grid_zone = 'W' )
    then 6000000
when ( grid_zone = 'X' and ( set % 2 ) = 1 and y_alpha_gsz = 'V'
)
    then 6000000
when ( grid_zone = 'X' and ( set % 2 ) = 1 and y_alpha_gsz != 'V'
)
    then 8000000
when ( grid_zone = 'X' and ( set % 2 ) = 0 and y_alpha_gsz = 'E'
)
    then 6000000
when ( grid_zone = 'X' and ( set % 2 ) = 0 and y_alpha_gsz != 'E'
)
    then 8000000
end;

-- construct arrays describing grid zone squares
select into e100k_grp1 array['A','B','C','D','E','F','G','H'];
select into e100k_grp2 array['J','K','L','M','N','P','Q','R'];
select into e100k_grp3 array['S','T','U','V','W','X','Y','Z'];
select into n100k_grp1
array['A','B','C','D','E','F','G','H','J','K','L','M','N','P','Q','R','
S','T','U','V'];
select into n100k_grp2
array['F','G','H','J','K','L','M','N','P','Q','R','S','T','U','V','A','
B','C','D','E'];

-- derive X coordinate for grid zone square

for e_gsz in 1 .. 8 loop
    if ( set = 1 or set = 4 ) then
        if ( x_alpha_gsz = e100k_grp1[e_gsz] ) then
            e_coord := 100000 * e_gsz;
            exit;
        end if;
    elsif ( set = 2 or set = 5 ) then
        if ( x_alpha_gsz = e100k_grp2[e_gsz] ) then
            e_coord := 100000 * e_gsz;
            exit;
        end if;
    else
        if ( x_alpha_gsz = e100k_grp3[e_gsz] ) then
            e_coord := 100000 * e_gsz;
            exit;
        end if;
    end if;
end loop;

-- derive Y coordinate for grid zone square

for n_gsz in 1 .. 20 loop
    if ( set = 1 or set = 3 or set = 5 ) then
        if ( y_alpha_gsz = n100k_grp1[n_gsz] ) then
            n_coord = 100000 * ( n_gsz - 1 );
        end if;
    elsif( set = 2 or set = 4 or set = 6 ) then
```

```
if ( y_alpha_gsz = n100k_grp2[n_gsz] ) then
    n_coord = 100000 * ( n_gsz - 1 );
end if;
end if;
end loop;

-- derive grid coordinates and precision

grid = substring( usng, '[[::digit:]]*$' );

select into e_grid
case
when length( grid::text ) = 2
    then ( cast( substring( grid::text from 1 for 1 ) as integer )
) * 10000
when length( grid::text ) = 4
    then ( cast( substring( grid::text from 1 for 2 ) as integer )
) * 1000
when length( grid::text ) = 6
    then ( cast( substring( grid::text from 1 for 3 ) as integer )
) * 100
when length( grid::text ) = 8
    then ( cast( substring( grid::text from 1 for 4 ) as integer )
) * 10
when length( grid::text ) = 10
    then cast( substring( grid::text from 1 for 5 ) as integer )
end;

select into n_grid
case
when length( grid::text ) = 2
    then ( cast( substring( grid::text from 2 for 1 ) as integer )
) * 10000
when length( grid::text ) = 4
    then ( cast( substring( grid::text from 3 for 2 ) as integer )
) * 1000
when length( grid::text ) = 6
    then ( cast( substring( grid::text from 4 for 3 ) as integer )
) * 100
when length( grid::text ) = 8
    then ( cast( substring( grid::text from 5 for 4 ) as integer )
) * 10
when length( grid::text ) = 10
    then cast( substring( grid::text from 6 for 5 ) as integer )
end;

select into precision
case
when length( grid::text ) = 2
    then 10000
when length( grid::text ) = 4
    then 1000
when length( grid::text ) = 6
    then 100
when length( grid::text ) = 8
    then 10
when length( grid::text ) = 10
```

```
        then 1
    end;

-- create usng coords

xmin = round( ( e_coord + e_grid + ( precision / 2 ) ), 1 );
ymin = round( ( offset_north + n_coord + n_grid + ( precision / 2 ) ),
1 );

usng_coords = xmin || ' ' || ymin ;

return ( usng_coords );

end;

$$ language 'plpgsql';
```

4.5.36 XYCoordinate Completeness Measure

Measure Name

XYCoordinateCompletenessMeasure

Measure Description

This measure checks for coordinates pairs with one member missing. The query produces a list of Address ID and coordinate values where one of the coordinates is null.

Report

Logical consistency

Evaluation Procedure

Check for null values.

Spatial Data Required

AddressPtCollection

Code Example: Testing Records

```
SELECT
    AddressID,
    AddressXCoordinate,
    AddressYCoordinate
FROM
    AddressPtCollection
WHERE
    AddressXCoordinate isnull OR AddressYCoordinate isnull
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the query example.

Function Parameters

count_of_nonconforming_records

```
SELECT
```

```
COUNT( * )
FROM
    AddressPtCollection
WHERE
    AddressXCoordinate isnull OR AddressYCoordinate isnull
count_of_total_records

SELECT
    COUNT( * )
FROM
    AddressPtCollection
```

Result Report Example

Tested XYCoordinateCompletenessMeasure at 93% conformance.

4.5.37 XYCoordinate Spatial Measure

Measure Name

XYCoordinateSpatialMeasure

Measure Description

This measure compares the coordinate location of the addressed object with the coordinate attributes. The measure applies to both types of coordinate pairs listed in Part One: Address XCoordinate, Address YCoordinate and Address Longitude, Address Latitude. The query produces a list of Address ID and coordinate values in the address collection that do not conform to a spatial domain.

Report

Positional accuracy

Evaluation Procedure

Check point locations where the geometry does not match coordinate attributes.

Spatial Data Required

AddressPtCollection

Code Example: Testing Records

It may be important to round the products of **ST_X** or **ST_Y** functions and the Address XCoordinate and Address YCoordinate values to get an accurate match.

Query

```
SELECT
    AddressID,
    AddressXCoordinate,
    AddressYCoordinate
FROM
    AddressPtCollection
WHERE
    ST_X( AddressPtGeometry ) != AddressXCoordinate
    or
    ST_Y( AddressPtGeometry ) != AddressYCoordinate
;
```

Code Example: Testing the Conformance of a Data Set

Function

See Perc Conforming for the query example.

Function Parameters

count_of_nonconforming_records

```
SELECT
    AddressID,
    AddressXCoordinate,
    AddressYCoordinate
FROM
    AddressPtCollection
WHERE
    ST_X( AddressPtGeometry ) != AddressXCoordinate
    OR
    ST_Y( AddressPtGeometry ) != AddressYCoordinate
;
```

count_of_total_records

```
SELECT
    COUNT( * )
FROM
    [AddressPtCollectionMeasureView][AddressPtCollection]
;
```

Result Report Example

Tested XYCoordinateSpatialMeasure at 90% conformance.

5. Part 4: Address Data Exchange

5.1 Introduction

The purpose of this section is three-fold: to provide a template for the XML documents and metadata that will move addresses from place to place, to provide information on preparing address data to be packaged, and to provide information on unpackaging address data that has been received.

Historically, the data format aspect of data exchange has impeded the flow of information. By providing a single and flexible data structure for exchanging street address data, the Address Standard will simplify the implementation of data exchanges, making them more reliable and less likely to need small changes, especially over time. Local data processing systems and applications change over time and frequently data exchange programs and reports must be rewritten along with those changes. Such changes may be as seemingly minor as the renaming of a data element, shortening or extending the length of a field, or the addition or subtraction of a field. When new data sharing partners are identified, a data format for sharing data with that partner must be constructed and implemented by each party. The Address Standard aims to minimize local changes necessary when upgrading computer systems and to provide a structure that can be reused by all data sharing parties without their having to implement something new.

The data sharing benefits of the Address Standard will only be realized when local agencies have implemented both export and import engines to process exchanged street addresses. The initial implementation of these data engines or programs will provide a lasting benefit to implementers in that once created, the agency will never again need to be concerned with creating programs or engines to share data with any new data sharing partners that they identify in the future.

The Address Standard is designed to be flexible enough to fit within current data sharing methods. There are two basic forms of sharing data between parties:

- 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.

5.2 Structure of a Transfer Package

All packages of address data to be exchanged must include:

- FGDC Metadata, conforming to the FGDC-STD-001-1998 *Content Standard for Digital Geospatial Metadata*, Version 2.0 (see Appendix A for a complete citation).
- Address data, expressed as an XML document conforming to the AddrStd XML Schema.

5.2.1 FGDC Metadata

Metadata provides a common set of terminology and definitions for the documentation of digital geospatial data (CSDGM, Introduction). It is a required part of all Federal

standards, and is required of all federally generated geospatial data per Executive Order 12906. The transfer of data always needs to be accompanied by copyright information, use restrictions, contact information, data lineage information, known data defects and a description of the geographic area that the data represents. The *Content Standard for Digital Geospatial Metadata* provides a uniform, consistent and well known way to express those things amongst others.

5.2.2 Address Data

The Address Standard XML schema is a way of packaging address data such that only fields meaningful to the particular data transfer package need to be included. The nature of XML is that only meaningful data is included but the meaning of everything that could be included is documented. In addition, XML data transfer implementations can be extended without breaking existing implementations. Existing implementations will not understand the extensions but by definition will ignore them.

Data is produced by agencies possessing address information and consumed by those receiving the address data. Many agencies will be both producers and consumers at different times. The roles of producer and consumer describe, respectively, the activity at hand when exporting or importing address data.

5.2.2.1 Exporting Data

A data producer will follow these basic steps while implementing an export:

- Construct a logical map of local data fields into the equivalent Address Standard Content and Classification elements.
- Write programs or subroutines to split local fields into the Address Standard elements if necessary.
- Collect support information required by the CSDGM metadata into an accessible place.
- Optionally, write programs or subroutines to automate the CSDGM "Data Quality" tests documented in the Data Quality section of this standard.
- Write programs or subroutines to include the CSDGM support data into a complete and valid CSDGM document.

A data producer will follow these basic steps while creating a package of address data:

- Run the Data Quality tests and collect the reports into the CSDGM metadata.
- Set the "Publication Date" element of the CSDGM metadata to be the time the package will be published.
- Run the data remapping and splitting programs.
- Set the "DirectSource" element of the Address Standard to be the producer's Id.
- Set the "AddressId" and "AuthorityId" elements of the Address Standard for any addresses created by the producer.
- Export the data into the Address Standard XML format.

- Transfer both the Address Standard XML document and the CSDGM document to another party.

5.2.2.2 Importing data

A data consumer will follow these basic steps while implementing an import:

- Construct a logical map of local data fields into the equivalent Address Standard Content and Classification elements.
- Write programs or subroutines to combine Address Standard elements into local data fields, if necessary.
- Create a place to store the CSDGM data from received packages.
- Optionally write programs or subroutines to automate the CSDGM "Data Quality" tests documented in the Data Quality section of this standard on the received data.

A data consumer will follow these basic steps while importing a package of address data:

- Receive both the Address Standard XML document and the CSDGM document from another party.
- Parse the Address Standard XML document into a working area.
- Parse the CSDGM XML document into a working area.
- Run the Data Quality tests and compare to the report in the CSDGM metadata received.
- Run the data remapping and combining programs.
- Import from the working area to the local production database.

When mapping local data fields into the equivalent Address Standard Content and Classification elements, or the reverse, it is important to understand that the Address Standard is set up to allow address producers to directly and unequivocally express the taxonomy of their own addresses. The Content and Classification sections provide a taxonomy to help parse addresses into descriptive elements.

For example, given an address such as **225 North Avenue Northwest Atlanta GA 30318**, the Address Standard allows the address producer to state that the word **North** is not a Street Name Pre Directional but is actually a Street Name. When stated by the actual addressing authority, it should be taken as factual and not converted.

Within other agencies, database design requirements might cause the address to be stored differently, but they should record the **official** form somewhere within their databases.

It is important, if distributing data received from other address authorities, that their taxonomy or parsing of addresses into elements be maintained and be reproducible.

5.3 The Address Standard XSD Data Model

Note: See Appendix H for the complete XSD document.

5.3.1 General Notes on the XML schema

Content and Classification use the word **element** in a way that differs slightly from its use in designing XML document schemes.

- Content and Classification use **element** to describe a taxonomy facet for parsing an address.
- XML Scheme Document (XSD) uses **element** to describe an XML tag.

Some Content and Classification **elements** become XSD elements and others become XSD attributes of other XSD elements.

The Address Standard XSD has been designed by creating a simple type for almost every thing in Content and Classification. The simple data type is a place to describe the form of data that populates the simple type. Many times no attempt to provide an automatable test for correctness of form is given in the XSD. Local implementers may attempt such tests outside the scope of the Address standard.

From the simple types simple elements are created. Simple elements and some simple types cluster into complex elements. Finally, elements are gathered into the **global** elements that comprise the top level XML data types.

5.3.2 Relation of the Address Standard XSD Data Model to the Content and Classification Parts.

A crosswalk chart relating the Content and Classification elements into XSD classes, types, elements, and attributes.

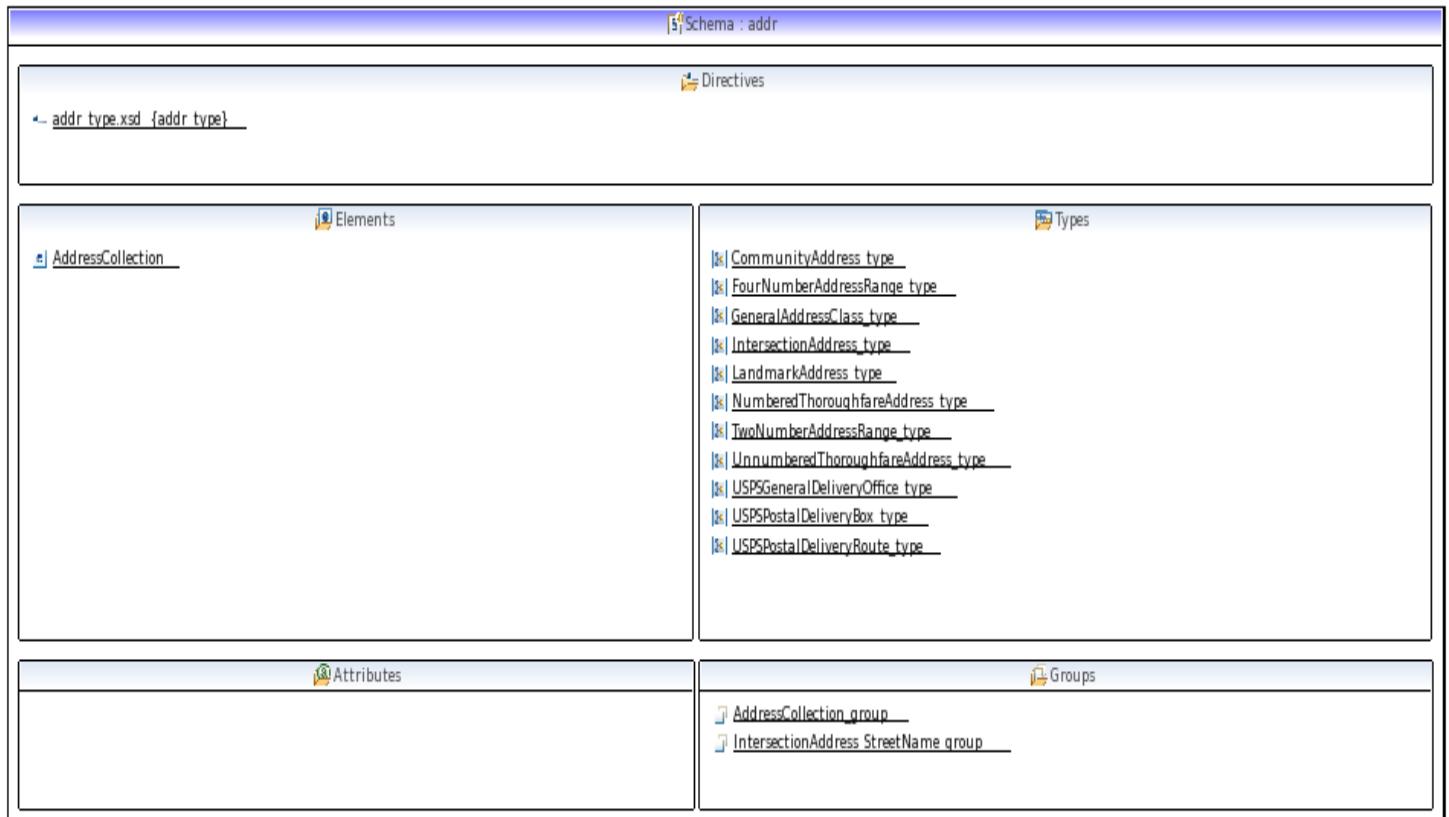
Classes	XSD Type Name	Simple or Complex (in XSD terms)	Element or Attribute Name	XSD	Parent XSD class
NumberereredThoroughfareAddress	NumberedThoroughfareAddress _type	Complex	NumberedThoroughfareAddress	Global Element	Global, AddressCollection
IntersectionAddress	IntersectionAddress _type	Complex	IntersectionAddress	Global Element	Global, AddressCollection
TwoNumberAddressRange	TwoNumberAddressRange _type	Complex	TwoNumberAddressRange	Global Element	Global, AddressCollection
FourNumberAddressRange	FourNumberAddressRange _type	Complex	FourNumberAddressRange	Global Element	Global, AddressCollection
UnnumberedThoroughfareAddress	UnnumberedThoroughfareAddress _type	Complex	UnnumberedThoroughfareAddress	Global Element	Global, AddressCollection
LandmarkAddress	LandmarkAddress _type	Complex	LandmarkAddress	Global Element	Global, AddressCollection
Community (Urbanization) Address	CommunityAddress _type	Complex	CommunityAddress	Global Element	Global, AddressCollection
USPS Postal Delivery Box	USPSPostalDeliveryBox _type	Complex	USPSPostalDeliveryBox	Global Element	Global, AddressCollection
USPS Postal Delivery Route	USPSPostalDeliveryRoute _type	Complex	USPSPostalDeliveryRoute	Global Element	Global, AddressCollection
USPS General Delivery Address	USPSGeneralDeliveryAddress _type	Complex	USPSGeneralDeliveryAddress	Global Element	Global, AddressCollection
General Address	GeneralAddressClass _type	Complex	GeneralAddressClass	Global Element	Global, AddressCollection
AddressReferenceSystem	AddressReferenceSystem _type	Complex	AddressReferenceSystem	Global Element	Global, AddressCollection
	AddressColection _type	Complex	AddressColection	Global Element	
Complete Address Number	CompleteAddressNumber _type	Complex	CompleteAddressNumber	Element	Various, AddressNumberRange
Address Number Prefix	AddressNumberPrefix _type	Simple	Prefix	Element	CompleteAddressNumber, AddressNumberRange
Address Number	AddressNumber _type	Simple	Number	Element	CompleteAddressNumber, AddressNumberRange
Address Number Suffix	AddressNumberSuffix _type	Simple	Suffix	Element	CompleteAddressNumber, AddressNumberRange
SeparatorElement	SeparatorElement _type	Simple	SeparatorElement	Attribute	CompleteAddressNumber,

Classes	XSD Type Name	Simple or Complex (in XSD terms)	Element or Attribute Name	XSD	Parent XSD class
CompletStreetName	CompleteStreetName_type	Complex	CompleteStreetName	Element	AddressNumberRange
Street Name Pre-modifier	StreetNameModifier_type	Simple	PreModifier	Element	CompleteStreetName
Street Name Pre-directional	StreetNameDirectional_type	Simple	PreDirectional	Element	CompleteStreetName
Street Pre-type	StreetNameType_type	Simple	PreType	Element	CompleteStreetName
Street Name	StreetName_type	Simple	StreetName	Element	CompleteStreetName
Street Post-type	StreetNameType_type	Simple	PostType	Element	CompleteStreetName
Street Post-directional	StreetNameDirectional_type	Simple	PostDirectional	Element	CompleteStreetName
Street Name Post-modifier	StreetNameModifier_type	Simple	PostModifier	Element	CompleteStreetName
CompleteSubaddress	CompleteSubaddress_type	Complex	CompleteSubaddress	Element	Global objects
Subaddress Type	SubaddressType_type	Simple	SubaddressType	Element	Building
Subaddress Identifier	SubaddressIdentifier_type	Simple	SubaddressIdentifier	Element	Building
CompleteLandmarkName	CompleteLandmarkName_type	Simple	CompleteLandmarkName	Element	Global objects
Landmark Name	LandmarkName_type	Complex	LandmarkName	Element	LandmarkAddress
Community (Urbanization) Place Name	CommunityPlaceName_type	Simple	CommunityPlaceName	Element	PlaceName, LandmarkSiteAddress, CommunityAddress
CompletePlaceName	completePlaceName_type	Complex	CompletePlaceName	Element	Global objects
PlaceName	PlaceName_type	Simple	PlaceName	Element	CompletePlaceName
PlaceNameType	PlaceNameType_type	Simple	PlaceNameType	Attribute	PlaceName
County Name	CountyName_type	Simple	CountyName_type	Element	PlaceName
State	StateName_type	Simple	StateName	Element	Global objects
ZIP Code	ZipCode_type	Simple	ZipCode	Element	Global objects
ZIP+4 Code	ZipPlus4_type	Simple	ZipPlus4	Element	Global objects
CountryName	CountryName_type	Simple	CountryName	Element	Global objects
USPS Box Type	USPSBoxType_type	Simple	USPSBoxType	Attribute	USPSBox
USPS Box ID	USPSBoxId_type	Simple	USPSBoxId		USPSBox
	USPSBox_type	Complex	USPSBox	Element	UPSPostalDelivery Classes
USPS Box Group Type	USPSBoxGroupType_type	Simple	USPSBoxGroupType	Attribute	USPSBoxGroup
USPS Box Group ID	USPSBoxGroupId_type	Simple	USPSBoxGroupId		USPSBoxGroup
	USPSBoxGroup_type	Complex	USPSBoxGroup	Element	UPSPostalDelivery Classes
USPS General Delivery Point	USPSGeneralDeliveryPoint_type	Simple	USPSGeneralDeliveryPoint	Element	UPSPostalDelivery Classes

Classes	XSD Type Name	Simple or Complex (in XSD terms)	Element or Attribute Name	XSD	Parent XSD class
DeliveryAddress	CompleteFeatureAddress_type	Simple	DeliveryAddress	Element	GeneralAddress
Place State ZIP	PlaceStateZip_type	Simple	PlaceStateZip	Element	GeneralAddress
Address ID	AddressId_type	Simple	AddressId	Element	Global objects
Address X Coordinate	AddressXCoordinate_type	Simple	X	Element	XYCoordinate
Address Y Coordinate	AddressXCoordinate_type	Simple	Y	Element	XYCoordinate
Address Longitude	AddressLongitude_type	Simple	Longitude	Element	LongLat
Address Latitude	AddressLatitude_type	Simple	Latitude	Element	LongLat
US National Grid Coordinate	LocationUSNG_type	Simple	USNGCoordinate	Element	Global objects
Address Z Value	AddressZValue_type	Simple	Zvalue	Element	Global objects
Address Classification		Internal		Internal to model	The XSD element name stores this information
Feature Type	FeatureType_type	Simple	AddressFeatureType	Element	Global objects
Address Lifecycle Status	AddressLifecycleStatus_type	Simple	AddressLifecycleStatus	Element	Global objects
Address Official Status	AddressOfficialStatus_type	Simple	OfficialStatus	Element	Global objects
Address Anomaly Status	AddressAnomalyStatus_type	Simple	AddressAnomalyStatus	Element	Global objects
Address Range Type	AddressRangeType_type	Simple	AddressRangeType	Element	Global objects
Location Description	LocationDescription_type	Simple	LocationDescription	Element	Global objects
Address Number Parity	AddressNumberParity_type	Simple	Parity	Attribute	TwoNumberAddressRange
Address ReferenceSystem Name	AddressReferenceSystemName_type	Simple	AddressReferenceSystemName_type	Element	Global objects
Address ReferenceSystem Axis	AddressReferenceSystemAxes_type	Simple	AddressReferenceSystemAxis_type	Element	AddressReferenceSystem
Address ReferenceSystem DocumentCitation	AddressReferenceSystemDocumentCitation_type	Simple	AddressDocumentCitation_type	Element	AddressReferenceSystem
Address ReferenceSystem Origin	AddressReferenceSystemOrigin_type	Simple	AddressReferenceSystemOrigin_type	Element	AddressReferenceSystem
Address ReferenceSystem Extent	AddressReferenceSystemExtent_type	Simple	AddressReferenceSystemExtent_type	Element	AddressReferenceSystem
Address ReferenceSystem	AddressReferenceSystem_type	Complex	AddressReferenceSystem	Global Element	Global
Address Start Date	AddressStartDate_type	Simple	AddressStartDate	Element	Global objects
Address End Date	AddressEndDate_type	Simple	AddressEndDate	Element	Global objects
Address Direct Source	AddressDirectSource_type	Simple	AddressDirectSource	Element	Global objects
Address Authority	AddressAuthority_type	Simple	AddressAuthority	Element	Global objects
Address Authority Identifier	AddressAuthorityIdentifier_type	Simple	AddressAuthorityIdentifier	Element	Global objects

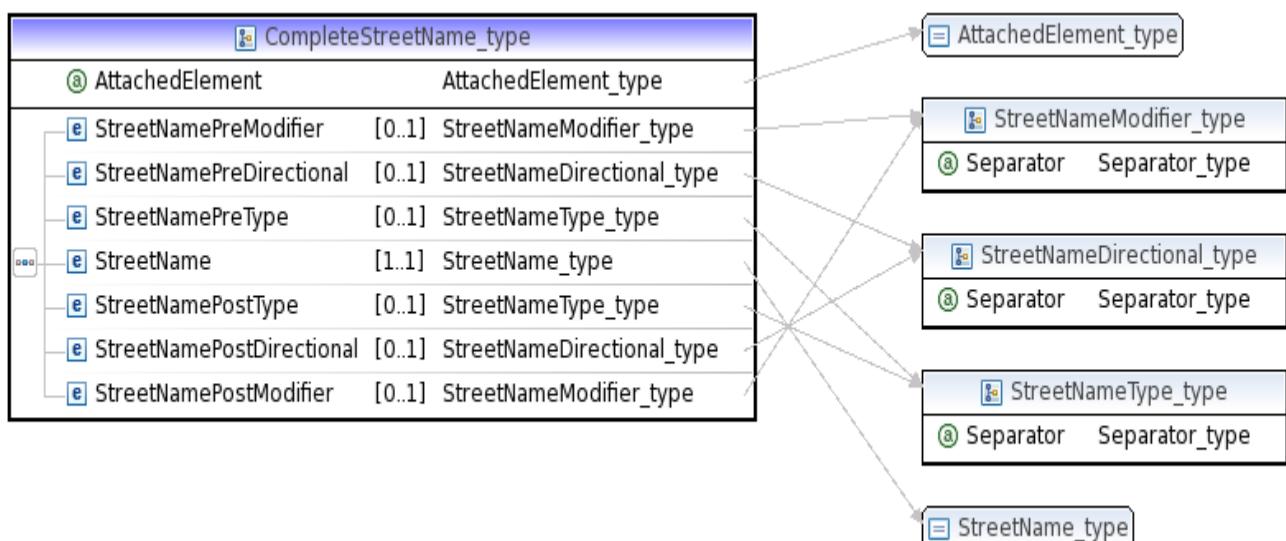
5.3.3 Diagrams of Elements of the XSD Datamodel

Data Model 0.4.2:

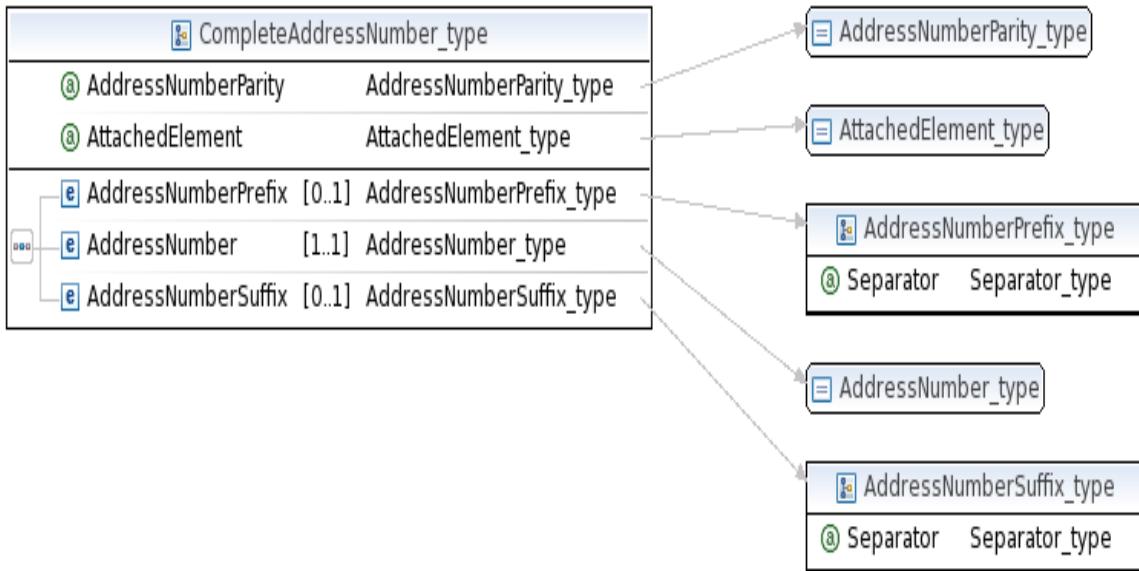


5.3.4 Complex Types

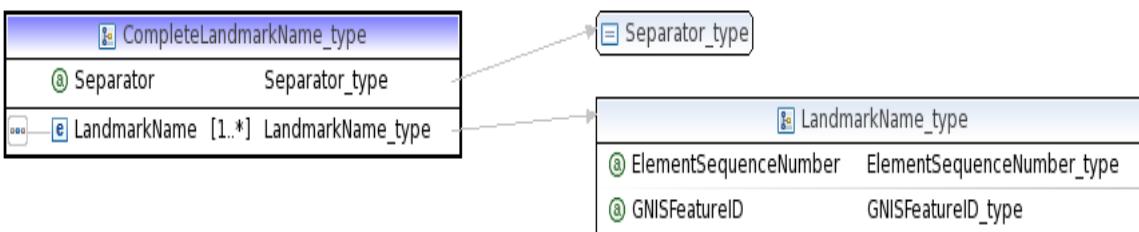
Complete Street Name v0.4.2:



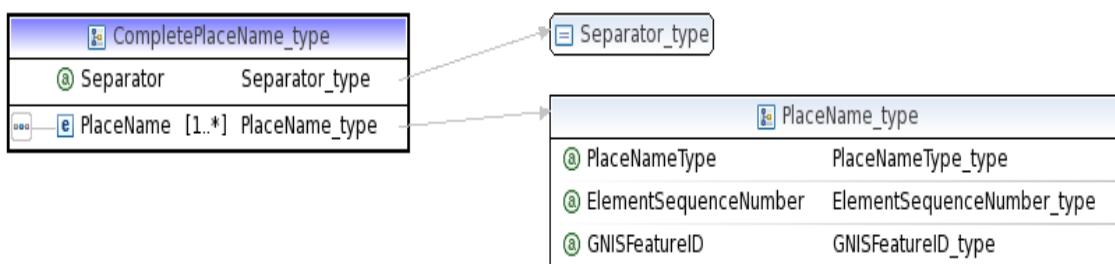
Complete Address Number v0.4.2:



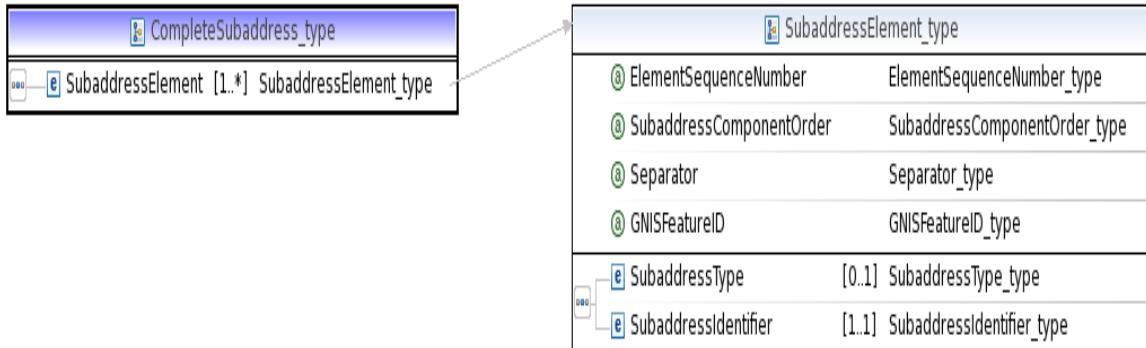
Complete Landmark Name v0.4.2:



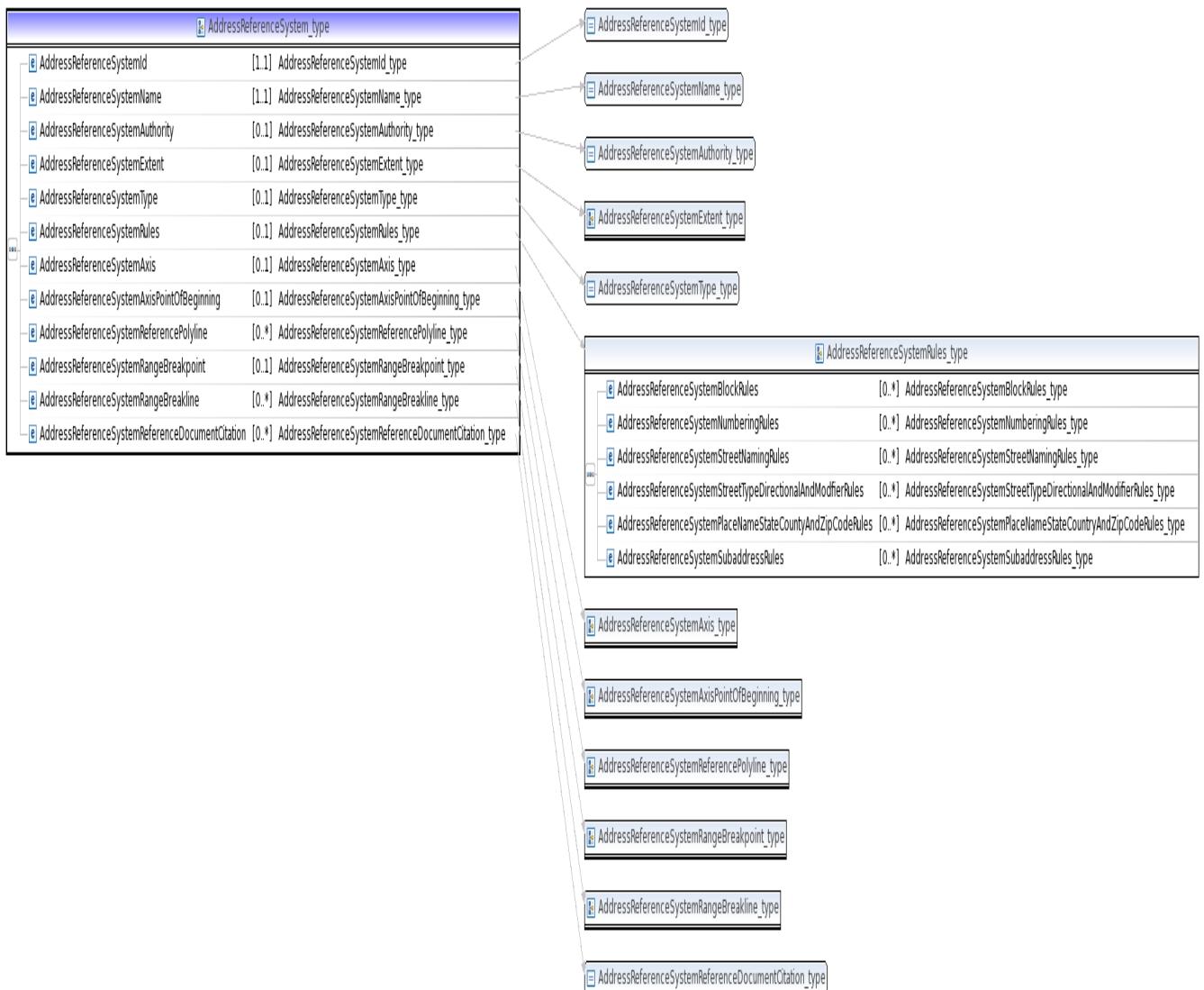
Complete Place Name v0.4.2:



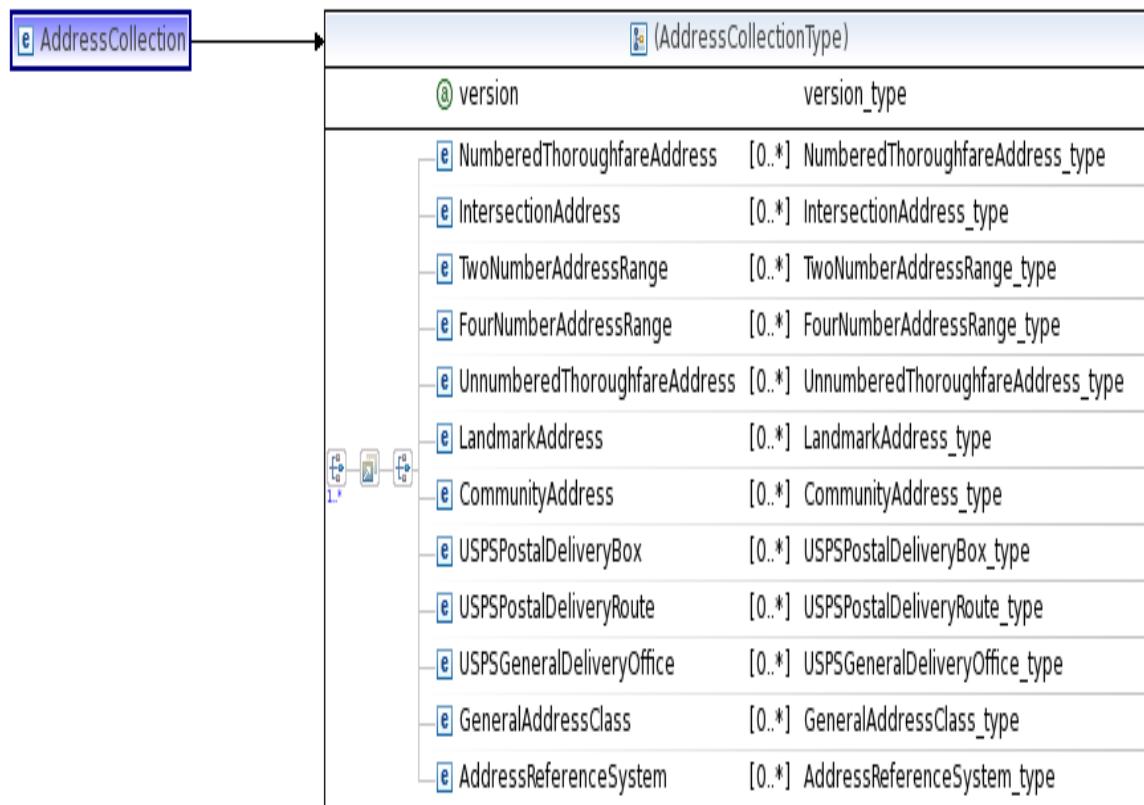
Complete Subaddress v0.4.2:



Address Referencesystem v0.4.2:

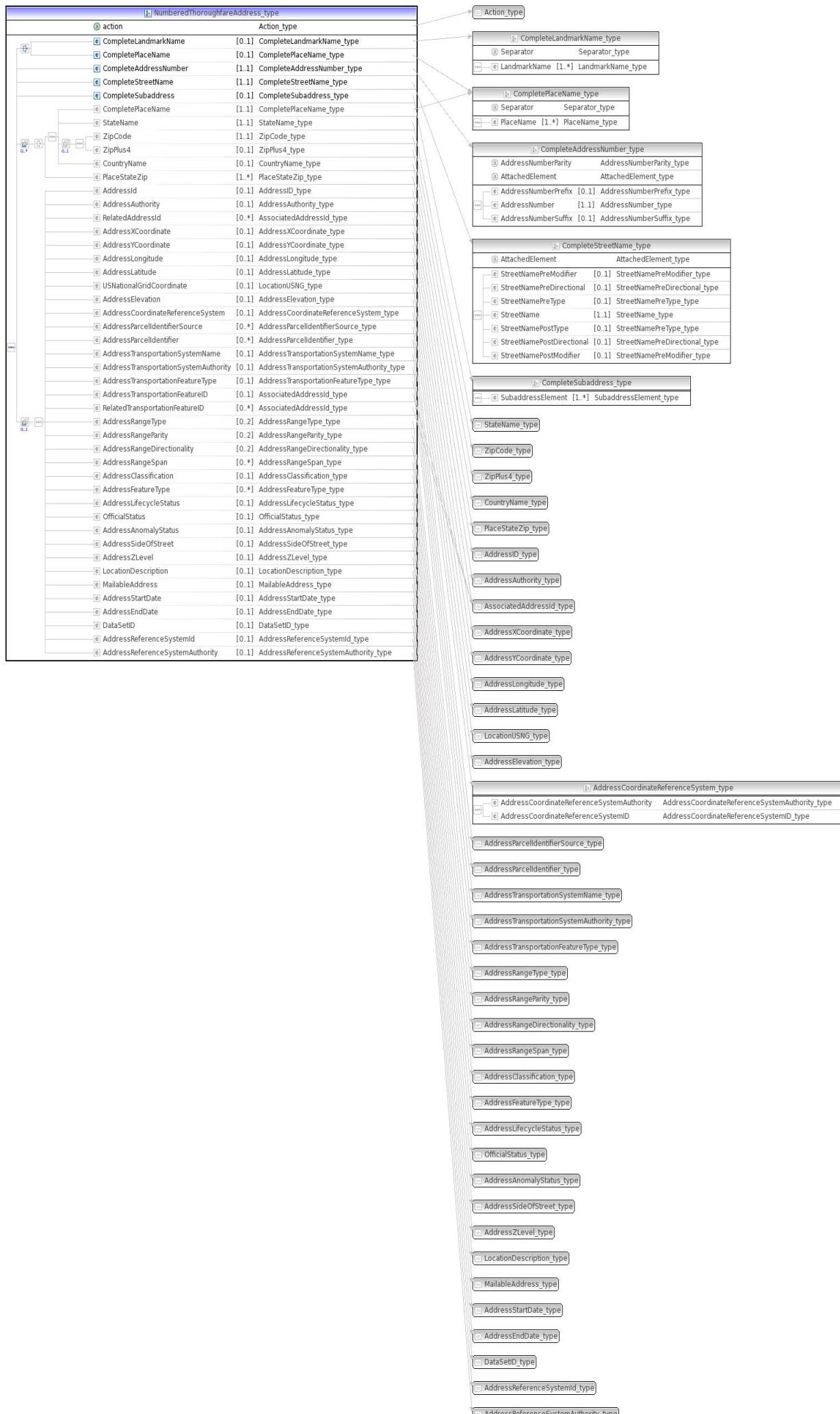


Address Collection v0.4.2:

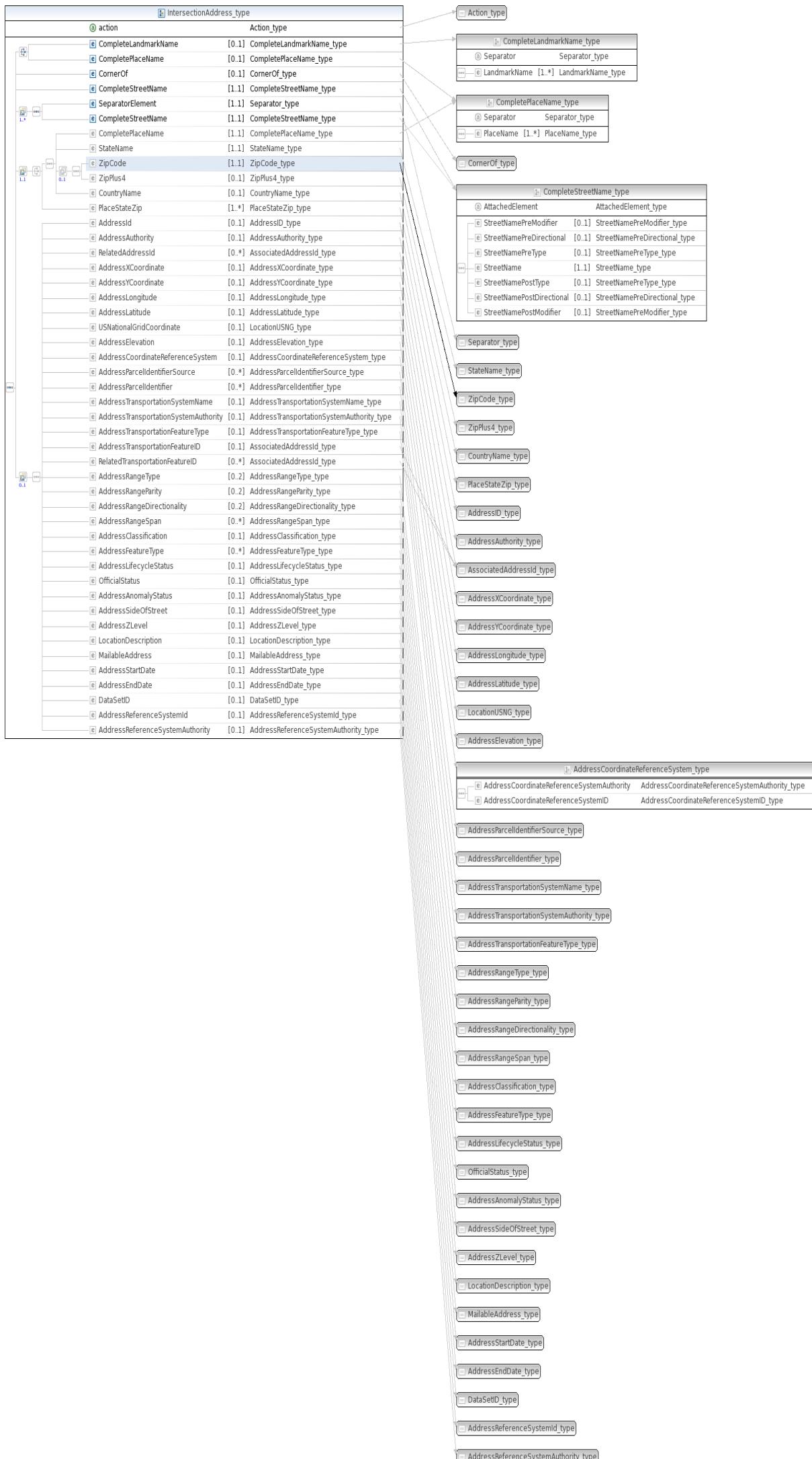


5.3.5 Thoroughfare Address Classes

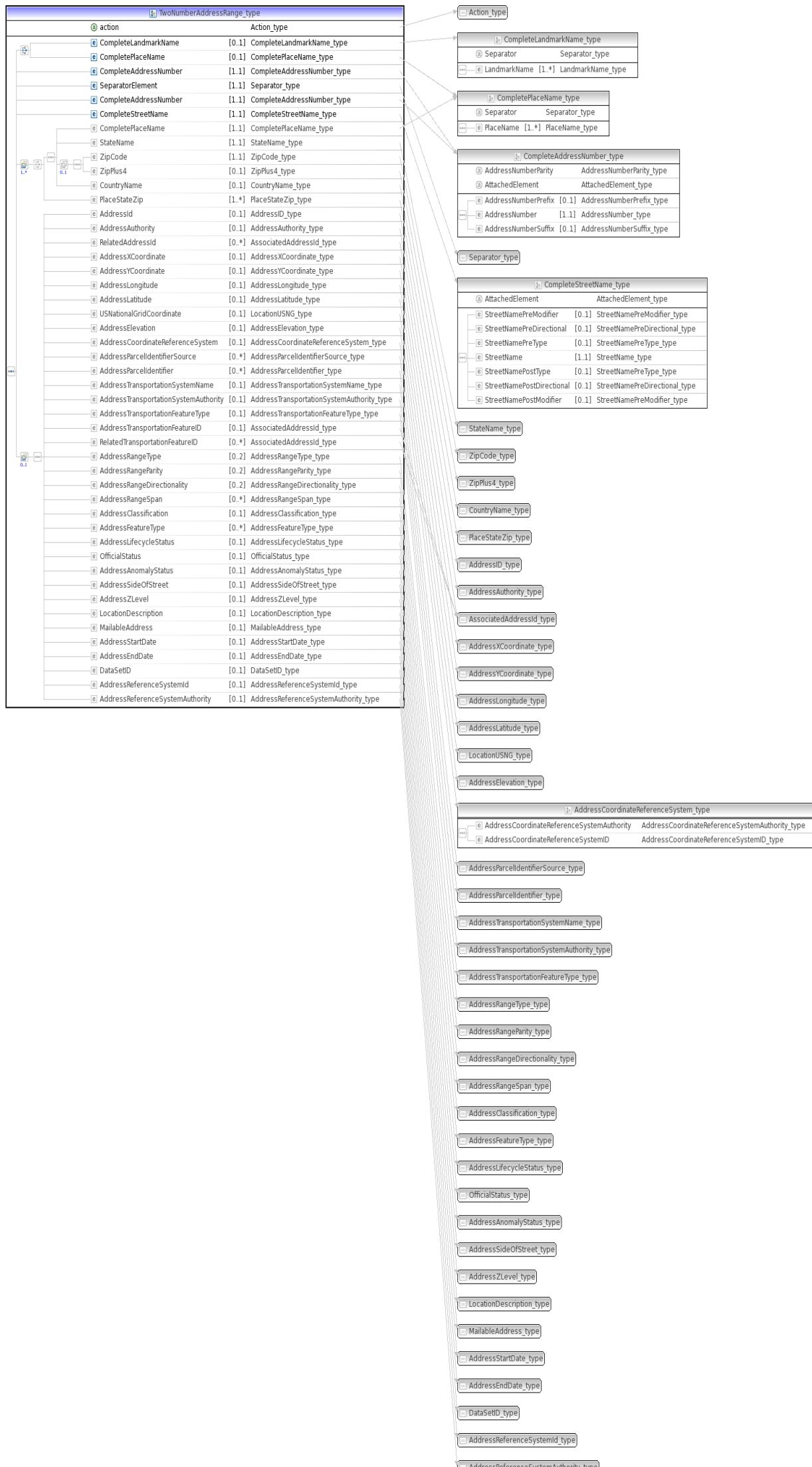
Numbered Thoroughfare Address v0.4.2:



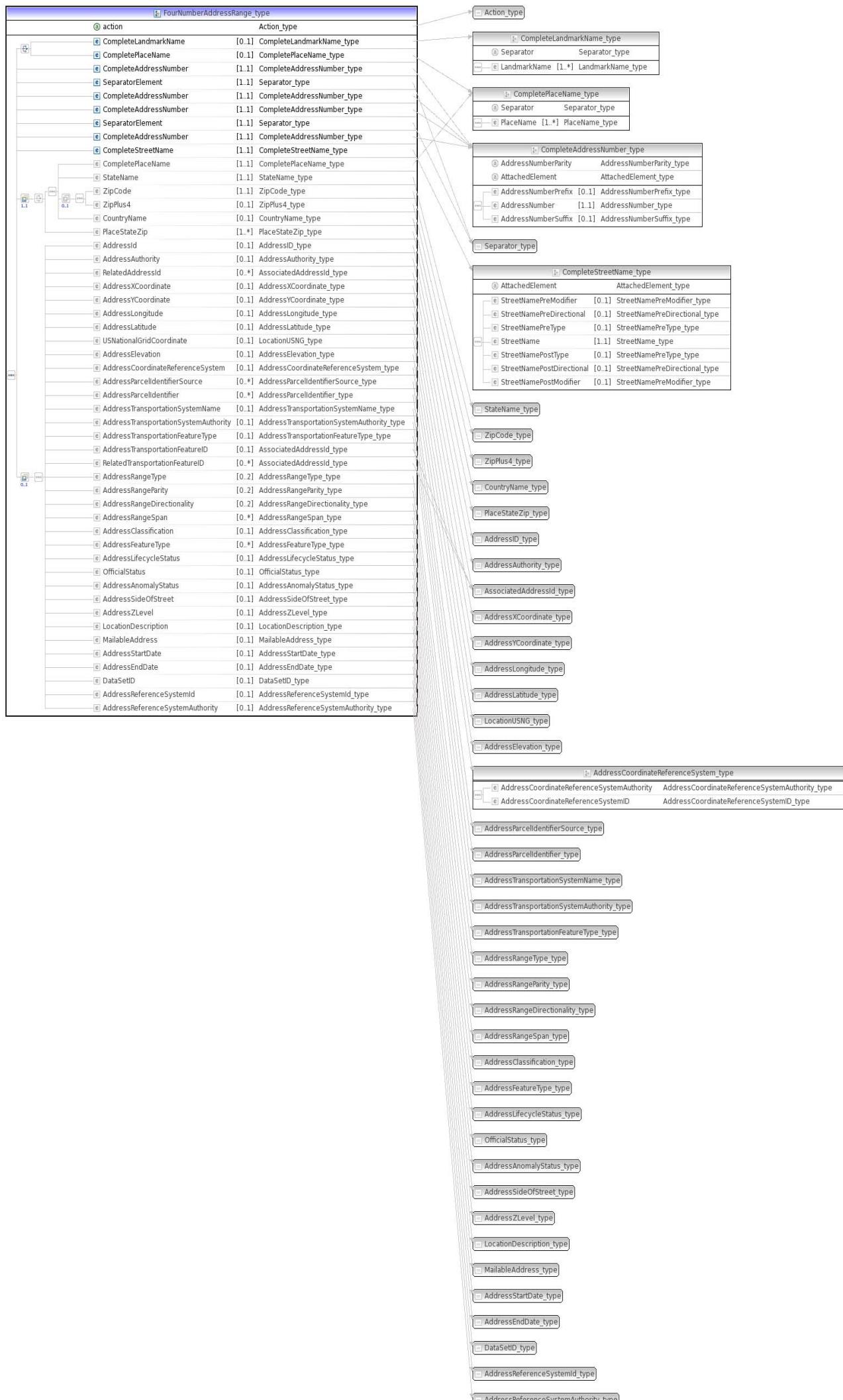
Intersection Address v0.4.2:



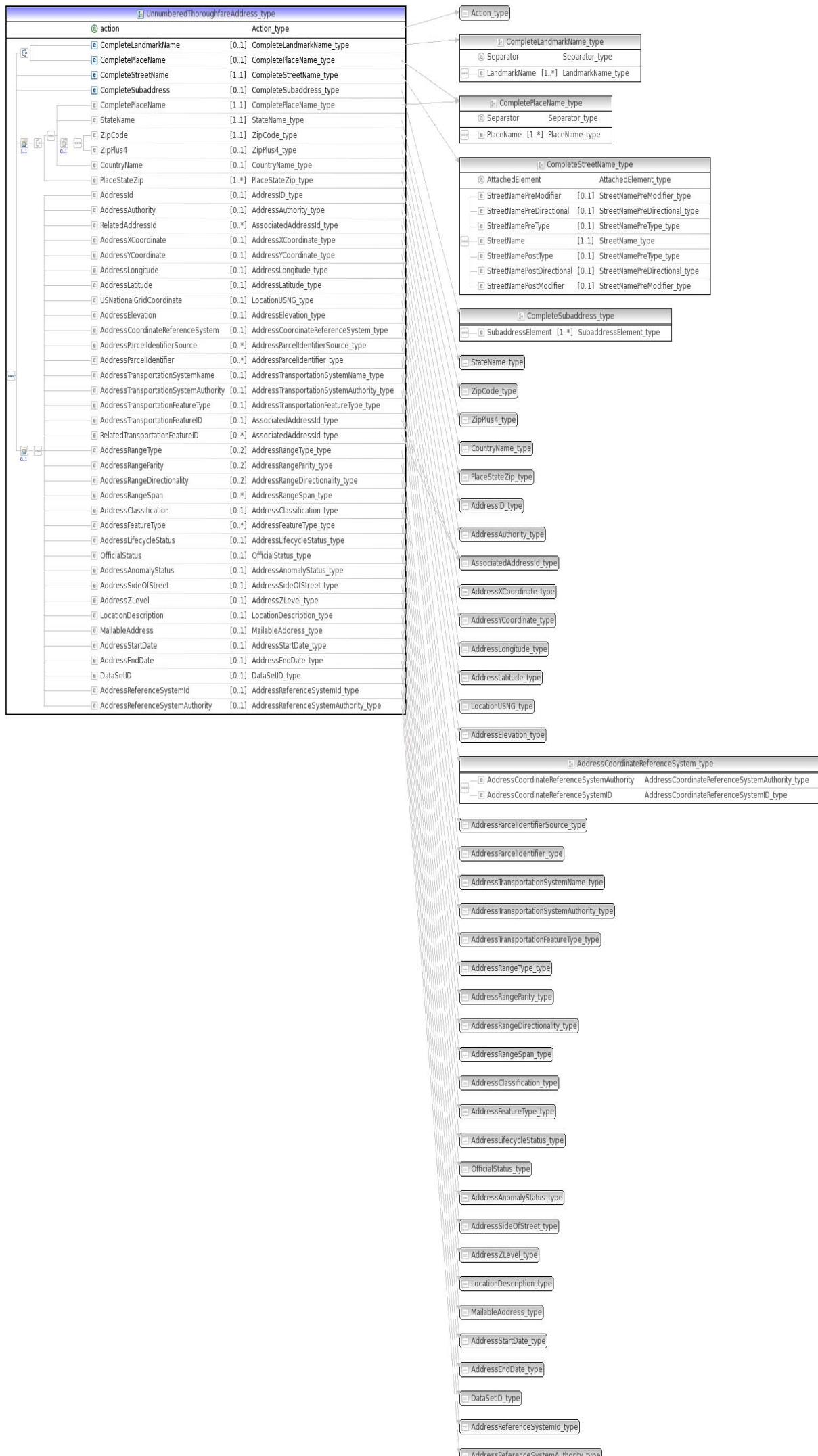
Two Number Address Range v 0.4.2:



Four Number Address Range v0.4.2:

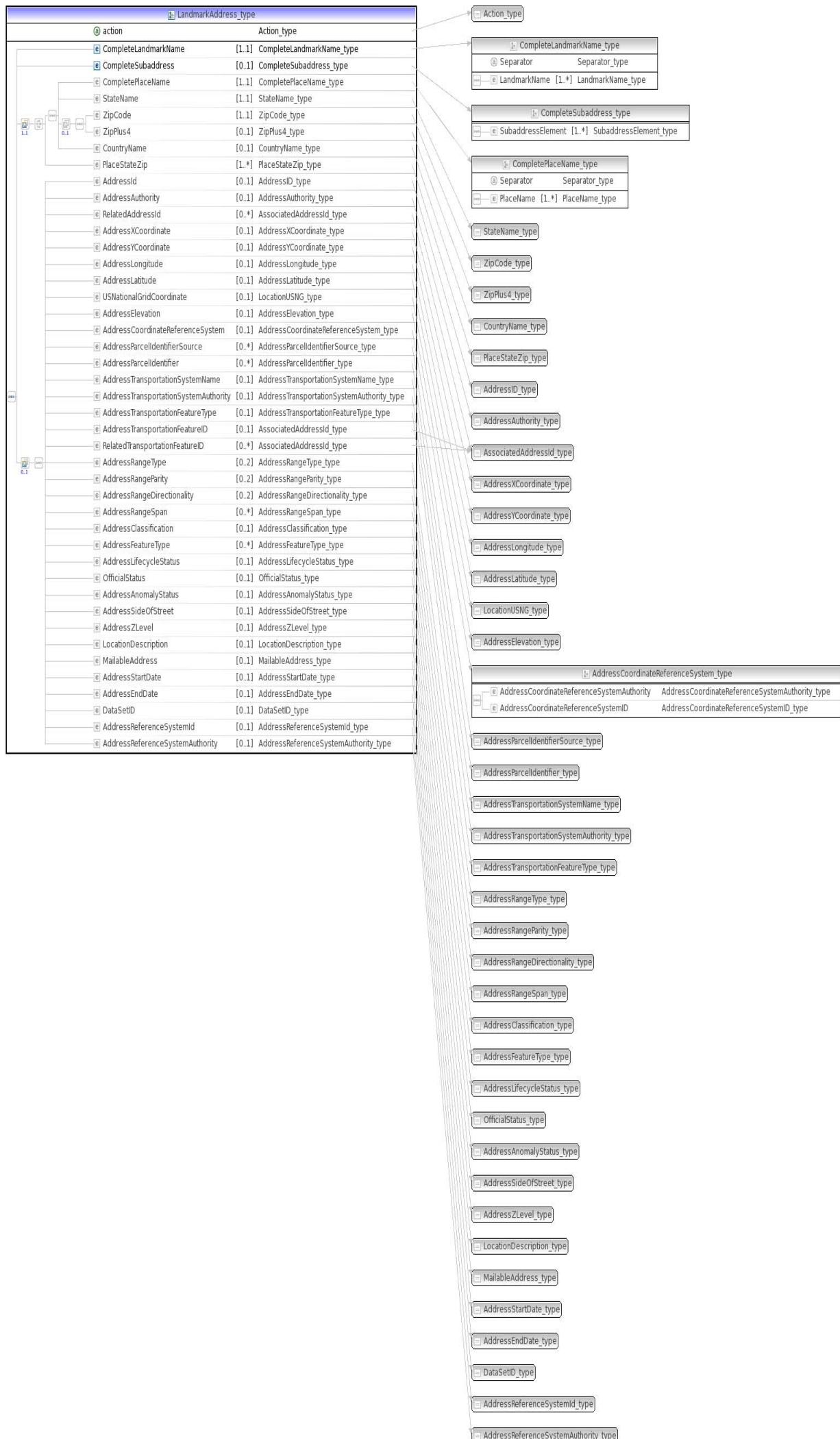


Unnumbered Thoroughfare Address v0.4.2:

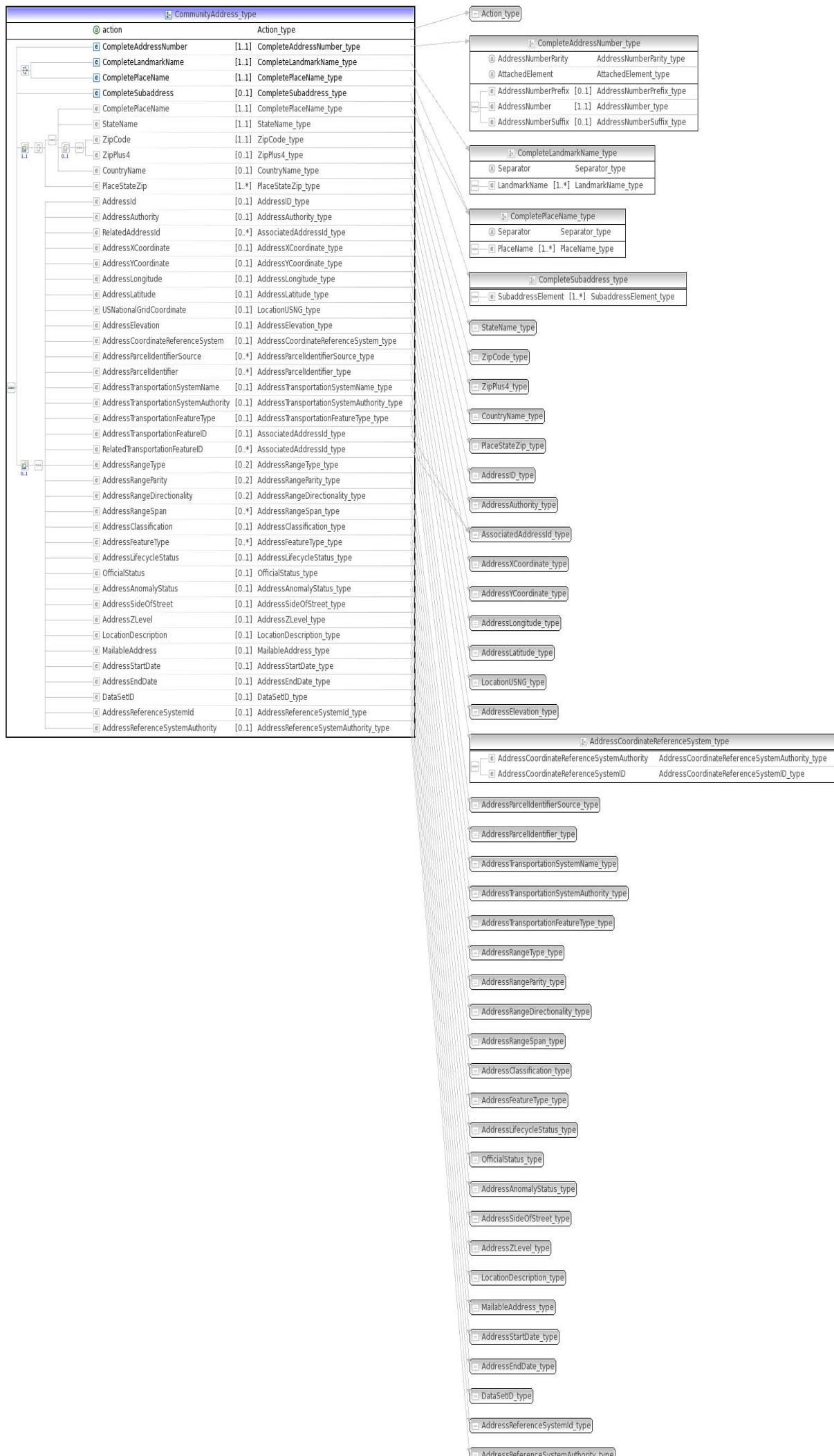


5.3.6 Landmark Address Classes

Landmark Address v0.4.2:

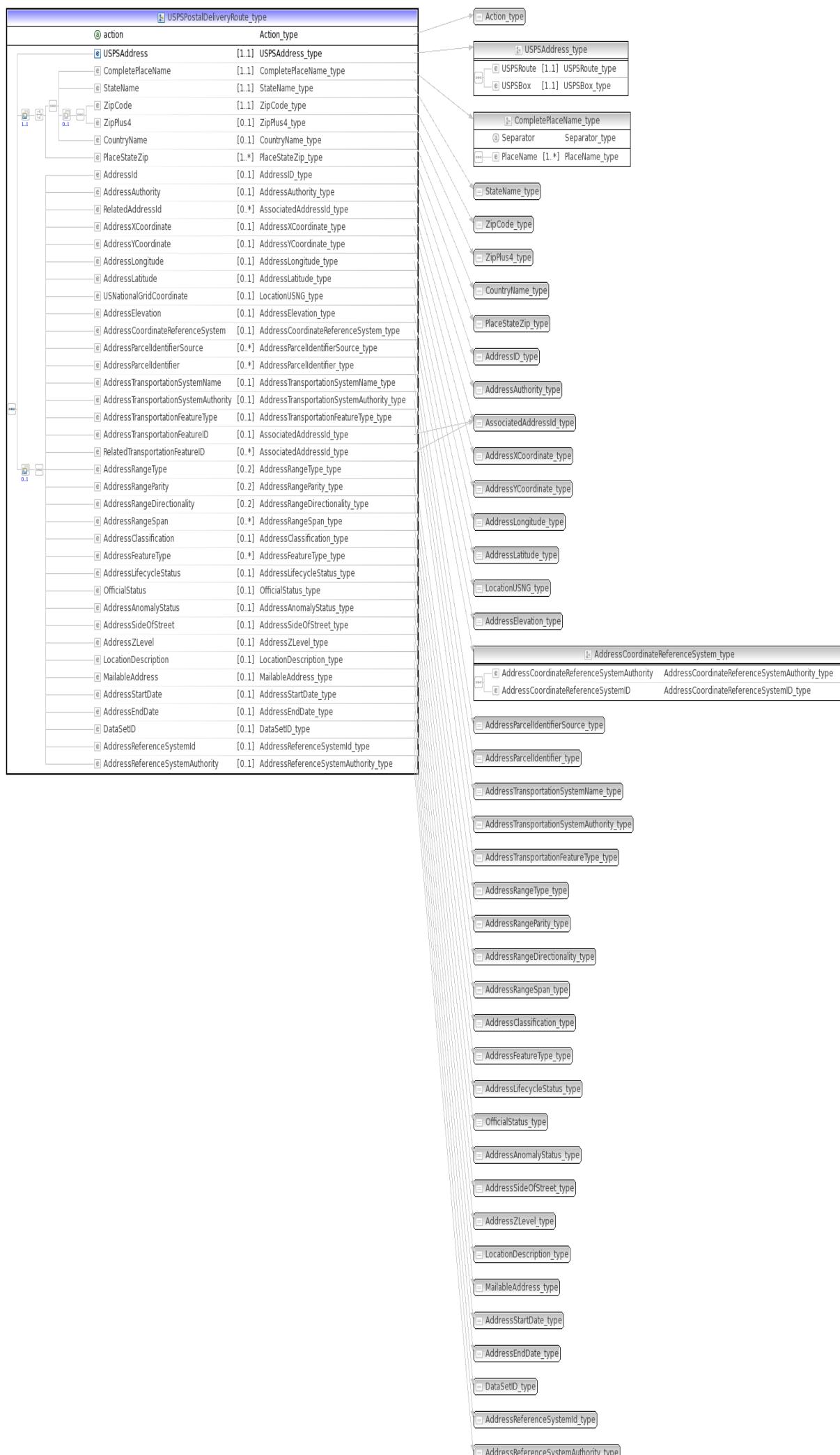


Community Address v0.4.2:

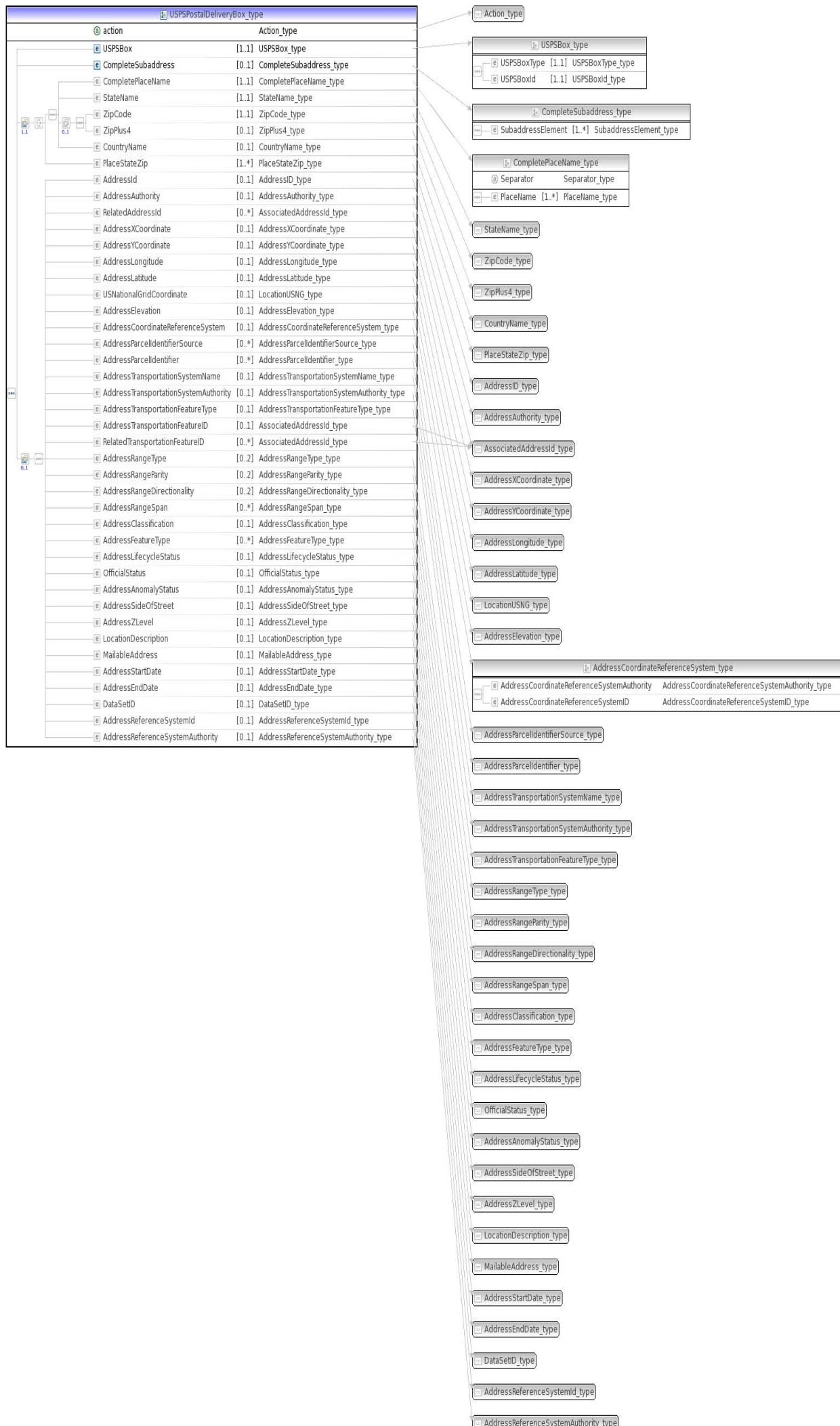


5.3.7 Postal Delivery Address Classes

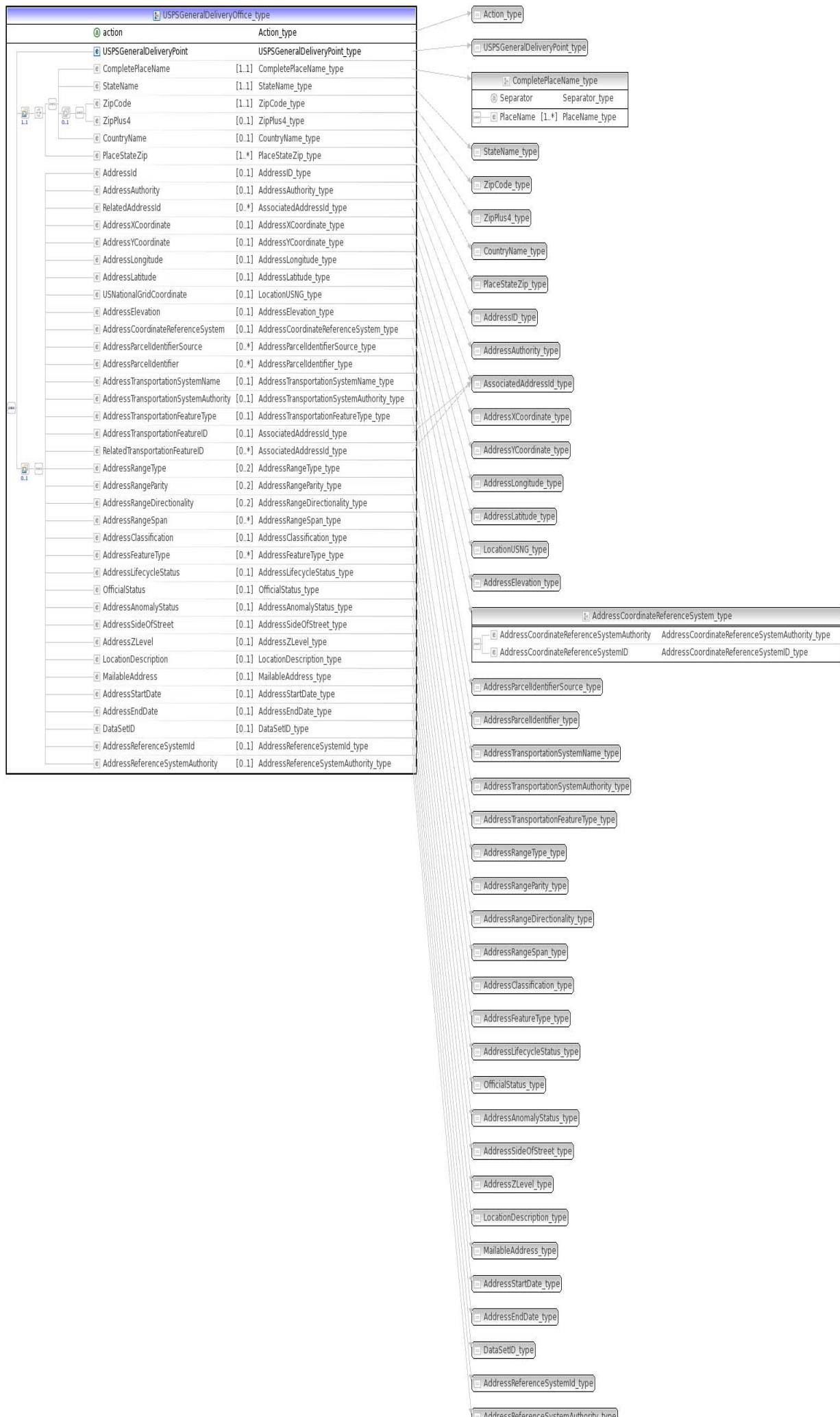
USPS Postal Delivery Route v0.4.2:



USPS Postal Delivery Box v0.4.2:

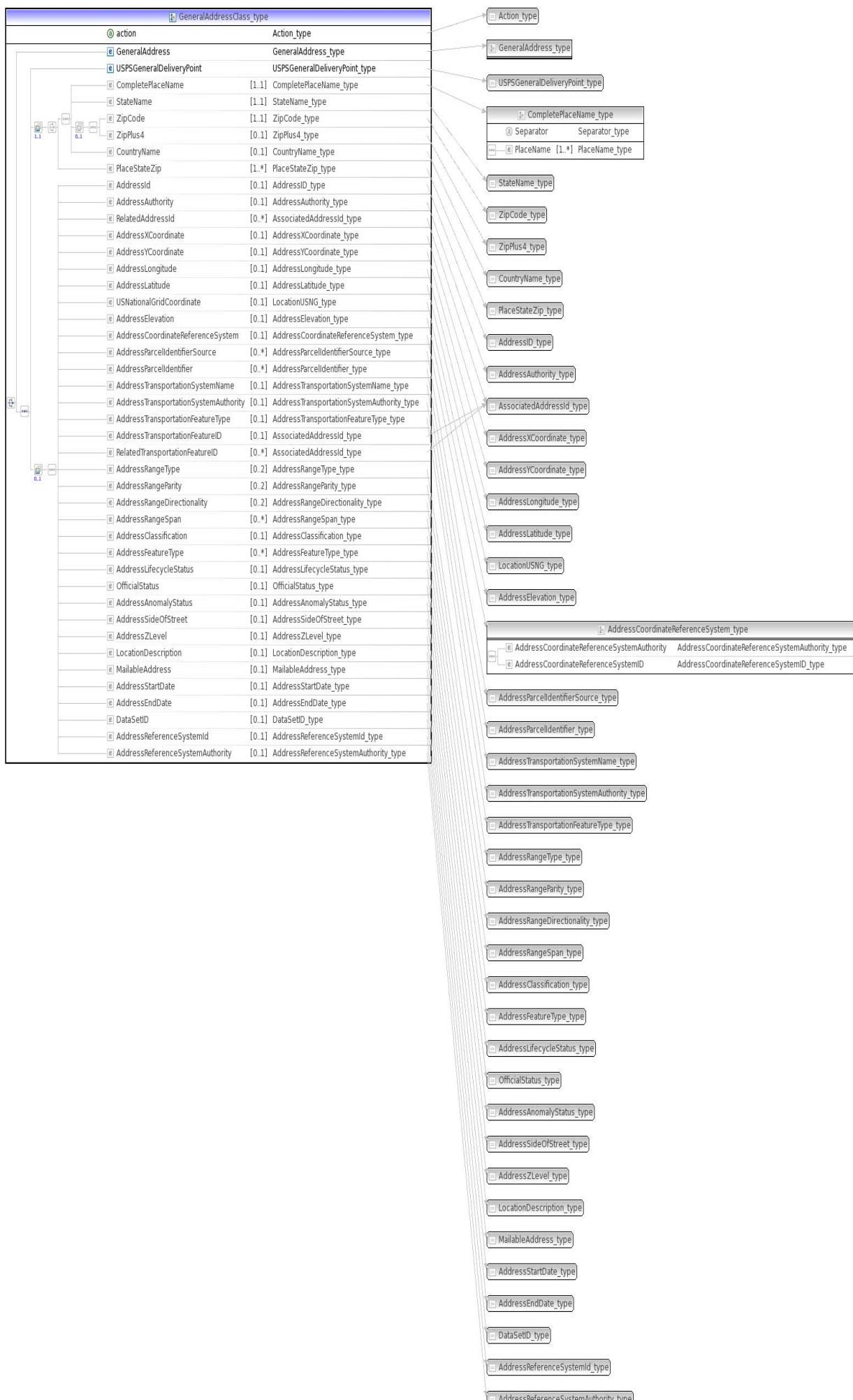


USPS General Delivery Office v0.4.2:

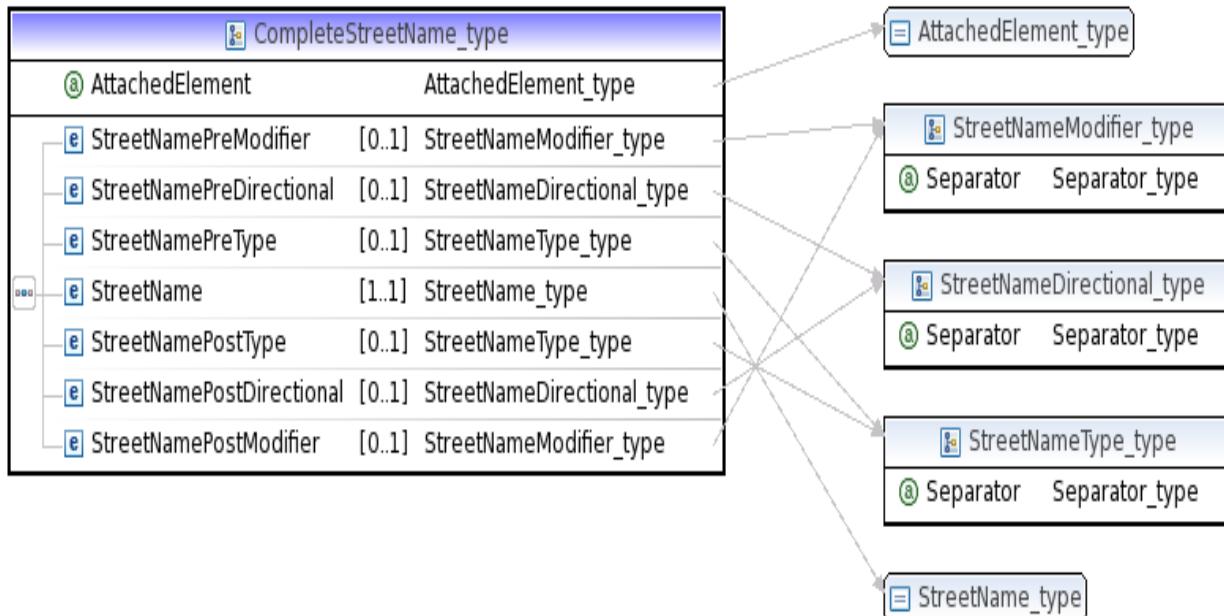


5.3.8 General Address Class

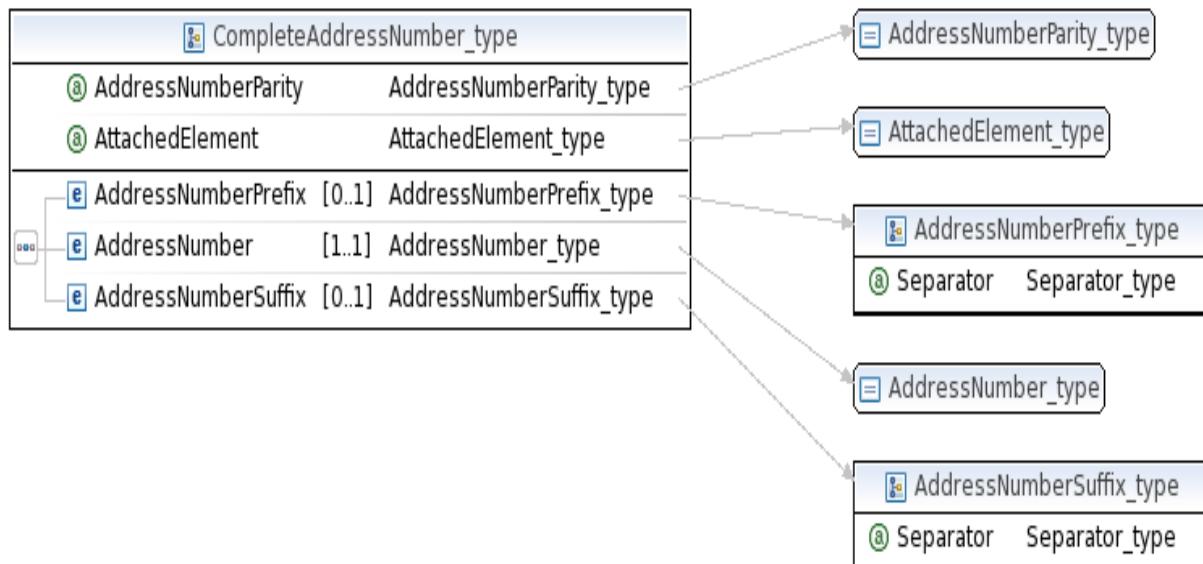
General Address Class v0.4.2:



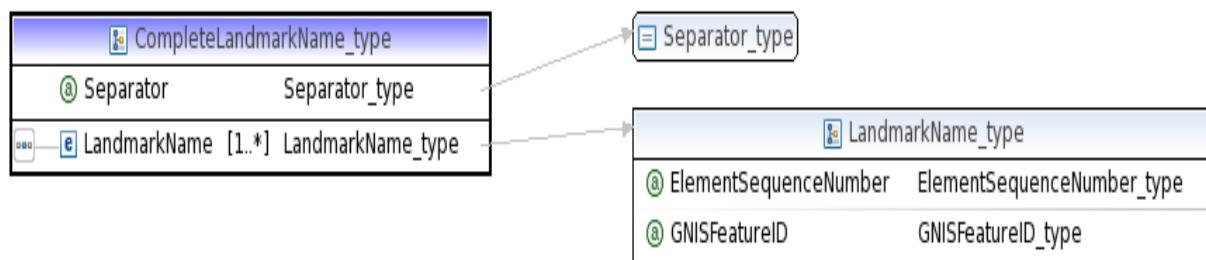
Complete Street Name v0.4:



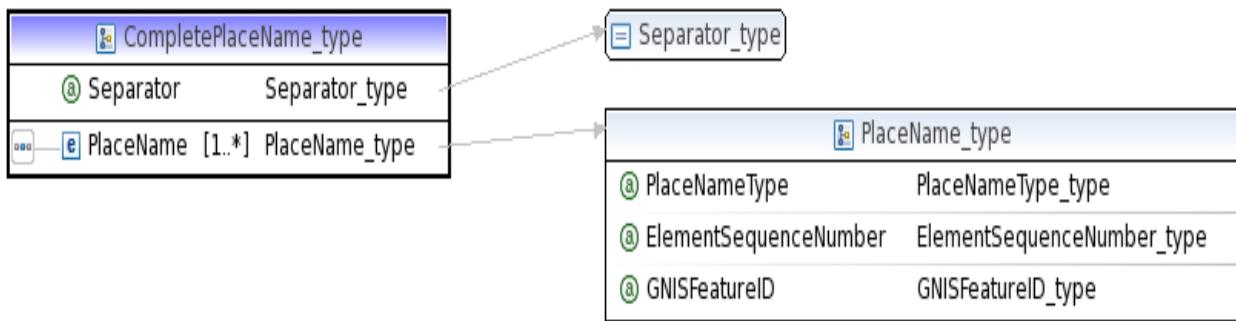
Complete Address Number v0.4:



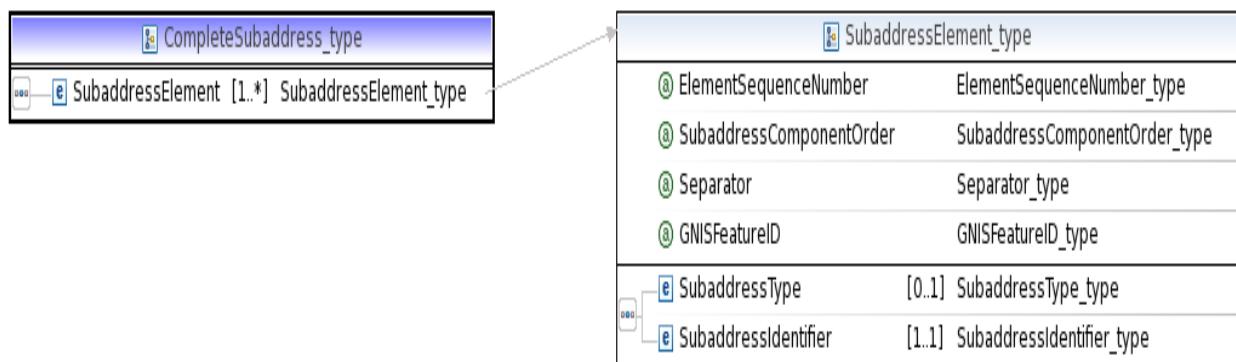
Complete Landmark Name v0.4:



Complete Place Name v0.4:



Complete Subaddress v0.4:



Appendix A (Informative): Reference Standards and Specifications

Note: Each citation indicates whether the cited work is normative or informative within this standard. All references and URLs were current as of September 4, 2010.

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 - 3.10 County-based Relationship Files:
 - 3.10.1 Address Range-Feature Name Relationships (pp. 3-86 thru 3-87),
 - 3.10.2 Address Ranges (pp. 3-87 thru 3-94),
 - 3.10.3 Feature Names (pp. 3-94 through 3-95)
 - Appendix C Feature Name Directionals
 - Appendix D Feature Name Qualifiers
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Appendix B (Informative): Table of Element Relationships

Note: The elements listed as part of or contained in other elements may be mandatory, conditional, or optional. Please see the individual element definitions to determine the parameters for each element.

Element Name	Element Type	Complex Elements This Element is Part Of	Element Contains These Simple Elements
Address Number Prefix	Simple	Complete Address Number	
Address Number	Simple	Complete Address Numbers	
Address Number Suffix	Simple	Complete Address Number	
Separator Element	Simple	Complete Address Number	
Complete Address Number	Complex	Delivery Address	Address Number Prefix Address Number Address Number Suffix Separator Element
Street Name Pre Modifier	Simple	Complete Street Name Delivery Address	
Street Name Pre Directional	Simple	Complete Street Name Delivery Address	
Street Name Pre Type	Simple	Complete Street Name Delivery Address	
Street Name	Simple	Complete Street Name Delivery Address	
Street Name Post Type	Simple	Complete Street Name Delivery Address	
Street Name Post Directional	Simple	Complete Street Name Delivery Address	
Street Name Post Modifier	Simple	Complete Street Name Delivery Address	
Complete Street Name	Complex	Delivery Address	Street Name Pre Modifier Street Name Pre Directional Street Name Pre Type Street Name Street Name Post Type Street Name Post Directional Street Name Post Modifier
Subaddress Type	Simple	Subaddress Element	
Subaddress Identifier	Simple	Subaddress Element	
Subaddress Element	Complex	Complete Subaddress	Subaddress Type Subaddress Identifier
Complete Subaddress	Complex	Delivery Address	Subaddress Element Subaddress Type Subaddress Identifier
Place Name	Simple	Place State ZIP	
State Name	Simple	Place State ZIP	
Zip Code	Simple	Place State ZIP	
Zip Plus 4	Simple	Place State ZIP	
Country Name	Simple		
USPSBox Type	Simple	Delivery Address	
USPSBox ID	Simple	Delivery Address	
USPSBox Group Type	Simple	Delivery Address	
USPSBox Group ID	Simple	Delivery Address	

Element Name	Element Type	Complex Elements This Element is Part Of	Element Contains These Simple Elements
Delivery Address	Complex		Complete Address Number Complete Street Name Complete Subaddress
Place State ZIP	Complex		Place Name State Name Zip Code Zip Plus 4

Appendix C (Informative): Relationship of Addresses to Transportation Features and Linear Reference Locations

1. *Introduction*

Appendix C presents the relationship between the Address Standard and the transportation part of the Framework Standard in three sections:

- Section 7.4.2 sets forth the relation between addresses and transportation networks, restates the scope of the address standard and the transportation standard, and defines the relationship between the two standards.
- Section 7.4.3 lists key transportation features defined in the framework standard transportation base part and states how address classes are related to transportation features.
- Section 7.4.4 summarizes (from Annex B of the Framework Standard Transportation Base Part) the definition of linear reference systems and their components, and shows how addresses can be expressed as linear reference locations.

2. *Address Systems and Transportation Networks*

Addresses are a means by which people specify the location of travel origins and destinations and relate them to the transportation network. Most addresses specify locations for structures, land parcels, incidents, and infrastructure components such as poles or hydrants. None of these features are transportation segments or nodes. By relating non-transportation features to the transportation network, thoroughfare addresses enable people to locate the address using the transportation network and travel to it along network paths. The Address Standard provides the data elements and structures—most of them non-geometric—needed to relate people's specific travel origins and destinations to the transportation network. The address standard also defines certain elements needed within the transportation standard to describe transportation features, most notably address numbers, address ranges, and street names.

The Transportation Part of the framework standard defines the geometric elements and structures needed to construct transportation networks, and the non-geometric attributes needed to describe them. Transportation networks show the paths of travel from origin to destination.

Transportation networks model the thoroughfares that thoroughfare addresses refer to, the particular thoroughfare segments by which individual addresses may be grouped into address ranges, the nodes that define intersections, and the left/right side by which odd/even parities are located. Numbered Thoroughfare Addresses and some ranges are typically modeled as point events (or occasionally linear events) located along the thoroughfare segments. Intersection Addresses and most ranges correspond to nodes and segments respectively. Thus the Framework Standard Transportation Part provides the geometric elements and structures needed to relate addresses to their corresponding transportation system segments and nodes.

The Address Standard and the Transportation Part are so closely related as to be interdependent. The following principles differentiate their scopes so as to be complementary and mutually exclusive:

1. The Address Standard defines the address classes, elements and attributes, none of which are network elements and almost all of which are non-geometric, and the Transportation Part incorporates them by reference.
2. The Address Standard provides for the description of Address Reference Systems, containing the rules for address assignment, and forming a basis for validation and quality testing of addresses. The elements of an Address Reference system include geometric components including Address Reference System Extent, Address Reference System Axis, Address Reference System Axis Point Of Beginning, Address Reference System Reference Polyline, Address Reference System Range Breakpoint, Address Reference System Range Breakline, and Address Reference System Range Polygon. These geometric elements can be related to the transportation elements as nodes, segments, point events, and linear events.
3. The Transportation Part defines the geometric structures and elements needed to comprise thoroughfare networks, and the address standard incorporates them by reference. They include transportation networks, nodes, and segments; point events and linear events.

3. Addresses And Transportation Features

3.1 Key Transportation Feature Definitions

The Transportation Part is Part 7 of the Framework Data Content Standard. It is comprised of five sub-parts: the Transportation Base part (Part 7), and five specialized subparts: Rail, Roads, Transit, and Inland Waterways (Parts 7b through 7e). (Part 7a, Transportation - Air, was drafted but not endorsed.)

The Base part (Part 7, section 5) defines several terms needed to articulate the relationship between addresses and transportation features:

- Transportation system - "set of components that allow movement of goods and people between locations" (sec. 5.25)
- Event - "mechanism for locating an attribute value or feature along a transportation feature." (sec. 5.4)
- Point event - "event that occurs at a single position along a linear feature." (sec. 5.12)
- Linear event - "event that occurs for an interval along the length of a feature." (sec. 5.8)
- Transportation point (TranPoint) - "topological connection between transportation segments." (sec. 5.22)
- Transportation segment (TranSeg) - "linear section of the physical transportation network." (sec. 5.23)
- Transportation path (TranPath) - "ordered list of whole or partial...transportation segments." (sec. 5.21)
- Transportation segmentation model - "set of transportation features (TranPath, TranPoint, and TranSeg) and their topological relationships which together define all possible movements through the transportation system" (sec. 5.24)

- Transportation feature (TranFeature) - "representation of transportation entities that include transportation segmentation model features, as well as other features relevant to transportation" (sec. 5.20)

3.2: Representing Addresses As Transportation Features

An address can be represented within a transportation network (e.g. a road centerline model) in various ways, depending on the class of the address and how it is mapped. This subsection gives the transportation feature types that can be used to represent each address class. The feature types are defined and explained in the FGDC's "Framework Data Content Standard Part 7: Transportation." See in particular "Transportation Base," Sections 5 (Terms and Definitions) and 7 (Requirements), and "Part 7c: Roads."

3.2.1 Representation of a Numbered Thoroughfare Address as a Transportation Feature:

- (If the address is mapped as a point): Point event, related to one or more transportation segments.
- (If the address is mapped as a line or polygon): Linear event, related to one or more transportation segments.

3.2.2 Representation of an Intersection Address as a Transportation Feature:

- One or more transportation points (TranPoints).
- Note that for complex intersections, or where roads are represented as two or more centerlines, one Intersection Address may be represented by multiple TranPoints.

3.2.3 Representation of a Two Number Address Range as a Transportation Feature:

- (If the range covers part of one transportation segment): Linear event, related to a transportation segment (TranSeg).
- (If the range covers one complete transportation segment): Transportation segment (TranSeg).
- (If the range covers more than one complete transportation segment): Transportation path (TranPath).

3.2.4 Representation of a Four Number Address Range as a Transportation Feature:

- (If the range covers part of one transportation segment): Linear event, related to a transportation segment (TranSeg).
- (If the range covers one complete transportation segment): Transportation segment (TranSeg).
- (If the range covers more than one complete transportation segment): Transportation path (TranPath).

3.2.5 Representation of an Unnumbered Thoroughfare Address as a Transportation Feature:

- (If the thoroughfare has only one segment): Transportation segment (TranSeg)
- (If the thoroughfare has more than one segment): Transportation path (TranPath)

3.2.6 Representation of a Landmark Address as a Transportation Feature:

- Cannot be specified within this standard. Addresses of this class have no defined relation to a transportation data model. A Landmark Address might be mapped as a point or a line or a polygon, and if represented as a polygon it might relate to zero or one or many transportation points or segments or paths.

3.2.7 Representation of a Community Address as a Transportation Feature:

- Cannot be specified within this standard. Addresses of this class have no defined relation to a transportation data model. A Community Address might be mapped as a point or a line or a polygon, and it might relate to zero or one or many transportation points or segments or paths.

3.2.8 Representation of a USPS Postal Delivery Box as a Transportation Feature:

- USPS Postal Delivery Box addresses have no definite relation to any transportation feature. (They could, if desired, be mapped to the post office where the box is located, and related to the post office Numbered Thoroughfare Address.)

3.2.9 Representation of a USPS Postal Delivery Route as a Transportation Feature:

- USPS Postal Delivery Route addresses have no definite relation to any transportation feature. Within the US, if the location of the delivery points are known, then Rural route and HC route addresses could be mapped as points, treated as point events, and related to a transportation segment. Overseas military addresses have no relation to any transportation feature.

3.2.10 Representation of a USPS General Delivery Office as a Transportation Feature:

- A USPS General Delivery Office could be mapped to a post office, or it could be said to have no relation to any transportation feature.
- Overseas military addresses have no relation to any transportation feature.

4. Expressing Address Locations as Linear Reference Positions

Linear Reference Systems and Addresses Linear reference systems specify locations by reference to distance traveled along a route within a transportation network. Linear reference systems differ fundamentally from address reference systems and coordinate reference systems, and thus offer a third way to specify address locations. Linear reference systems are used primarily in surveying and engineering, but they are also useful in address administration. Linear referencing explicitly ties an address to a specific position along its corresponding street segment. Linear reference systems are useful in visualizing address lists and building address zone information

when side of street matters. Linear referencing can therefore be useful in detecting mislocated thoroughfare addresses (out of sequence or wrong parity) and erroneous ranges.

Transportation Base Part (Annex B) provides normative classes and types needed to define linear reference systems and specify positions along curvilinear transportation features. Annex B, Section 5, defines several terms of interest:

- Position expression - "expression used to describe a position using linear referencing and comprised of a measured value (distance expression), the curvilinear element being measured, (linear element), the method of measurement (LRM), and an optional lateral offset (offset expression)."
- Distance expression - "linear distance measured along a linear element (a component of a position expression)."
- Linear element - "underlying curvilinear element along which a linearly referenced measure is taken."
- Offset - "Optional part of a linearly referenced position expression which specifies the lateral distance left or right of the linear element being measured."

Linear Referencing Locations and the Address Standard. Linear reference locations must be specified by reference to a transportation network as defined in the Transportation Part of the Framework Standard. The Transportation Part defines all the elements needed to construct the network and represent addresses within it (typically as point events). The Transportation Part also defines all the elements needed to establish and document linear reference locations, such as route, point of beginning, units of measure, method of measuring along the route, etc. Because linear reference locations can be constructed entirely within the domain of the Transportation Part of the framework standard, no linear reference attributes are provided or needed within the Address Standard.

Appendix D (Informative): Element Measure Index

Note: Tests followed by a "+" sign have spatial data requirements.

Element Name	Component or Subject	Simple or Complex	Measure
Address Number	Address Number	Simple	Data Type Measure
Address Number	Address Number	Simple	Spatial Domain Measure +
Address Number	Address Number	Simple	Range Domain Measure
Address Number	Address Number	Simple	Address Number Fishbones Measure +
Address Number Prefix	Address Number	Simple	Range Domain Measure
Address Number Prefix	Address Number	Simple	Spatial Domain Measure +
Address Number Prefix	Address Number	Simple	Tabular Domain Measure
Address Number Prefix	Address Number	Simple	Address Number Fishbones Measure +
Address Number Suffix	Address Number	Simple	Spatial Domain Measure +
Address Number Suffix	Address Number	Simple	Tabular Domain Measure
Address Reference System Authority	Address Reference System Elements	Simple	Tabular Domain Measure
Address Reference System Axis	Address Reference System Elements	Simple	Address Reference System Axes Point Of Beginning Measure +
Address Reference System Axis Point Of Beginning	Address Reference System Elements	Simple	Address Reference System Axes Point Of Beginning Measure +
Address Reference System Id	Address Reference System Elements	Simple	Data Type Measure
Address Reference System Id	Address Reference System Elements	Simple	Uniqueness Measure
Address Reference System Name	Address Reference System Elements	Simple	Tabular Domain Measure
Address Reference System Extent	Address Reference System Elements	Simple	Address Reference System Description
Address Reference System Type	Address Reference System Elements	Simple	Tabular Domain Measure
Address Reference System Rules	Address Reference System Elements	Complex	Address Reference System Rules Measure +
Address Reference System Block Rules	Address Reference System Elements	Simple	See Address Reference System Rules Measure.
Address Reference System Numbering Rules	Address Reference System Elements	Simple	See Address Reference System Rules Measure.
Address Reference System Street Naming Rules	Address Reference System Elements	Simple	See Address Reference System Rules Measure.
Address Reference System Street Type Directional And Modifier Rules	Address Reference System Elements	Simple	See Address Reference System Rules Measure.
Address Reference System Place Name State Country And Zip Code Rules	Address Reference System Elements	Simple	See Address Reference System Rules Measure.
Address Reference System Subaddress Rules	Address Reference System Elements	Simple	See Address Reference System Rules Measure.
Address Reference System Reference Polyline	Address Reference System Elements	Simple	See Address Reference System Rules Measure.
Address Reference System Range Breakpoint	Address Reference System Elements	Simple	See Address Reference System Rules Measure.
Address Reference System Range Breakline	Address Reference System Elements	Simple	See Address Reference System Rules Measure.

Element Name	Component or Subject	Simple or Complex	Measure
Address Reference System Range Polygon	Address Reference System Elements	Simple	See Address Reference System Rules Measure.
Address Reference System Reference Document Citation	Address Reference System Elements	Simple	None
Address Reference System	Address Reference System Elements	Complex	Address Reference System Rules Measure +
Complete Address Number	Address Number	Complex	Pattern Sequence Measure
Complete Landmark Name	Landmark Name Elements	Complex	Complex Element Sequence Number Measure
Complete Landmark Name	Landmark Name Elements	Complex	Pattern Sequence Measure
Complete Landmark Name	Landmark Name Elements	Complex	Repeated Element Uniqueness Measure
Complete Place Name	Place, State, and Country Name Elements	Complex	Complex Element Sequence Number Measure
Complete Place Name	Place, State, and Country Name Elements	Complex	Pattern Sequence Measure
Complete Place Name	Place, State, and Country Name Elements	Complex	Repeated Element Uniqueness Measure
Complete Street Name	Street Name Elements	Complex	Tabular Domain Measure
Complete Street Name	Street Name Elements	Complex	Pattern Sequence Measure
Complete Street Name	Street Name Elements	Complex	Duplicate Street Name Measure +
Complete Subaddress	Subaddress Elements	Complex	Complex Element Sequence Number Measure
Complete Subaddress	Subaddress Elements	Complex	Pattern Sequence Measure
Complete Subaddress	Subaddress Elements	Complex	Repeated Element Uniqueness Measure
Corner Of	Intersection Corner Element	Simple	Intersection Validity Measure Location Description Field Check Measure Tabular Domain Measure
Country Name	Place, State, and Country Name Elements	Simple	Spatial Domain Measure +
Country Name	Place, State, and Country Name Elements	Simple	Tabular Domain Measure
Delivery Address	USPS Address Lines	Simple	Pattern Sequence Measure
Landmark Name	Landmark Name Elements	Simple	Spatial Domain Measure
Landmark Name	Landmark Name Elements	Simple	Tabular Domain Measure
Landmark Name	Landmark Name Elements	Simple	Uniqueness Measure
Place Name	Place, State, and Country Name Elements	Simple	Spatial Domain Measure +
Place Name	Place, State, and Country Name Elements	Simple	Tabular Domain Measure
Place State ZIP	USPS Address Lines	Complex	Pattern Sequence Measure
Separator Element	Element	Simple	Tabular Domain Measure
State Name	Place, State, and Country Name Elements	Simple	Spatial Domain Measure +
State Name	Place, State, and Country Name Elements	Simple	Tabular Domain Measure

Element Name	Component or Subject	Simple or Complex	Measure
	Name Elements		
Street Name	Street Name Elements	Simple	Spatial Domain Measure +
Street Name	Street Name Elements	Simple	Tabular Domain Measure
Street Name Post Directional	Street Name Elements	Simple	Spatial Domain Measure +
Street Name Post Directional	Street Name Elements	Simple	Tabular Domain Measure
Street Name Post Modifier	Street Name Elements	Simple	Spatial Domain Measure +
Street Name Post Modifier	Street Name Elements	Simple	Tabular Domain Measure
Street Name Post Type	Street Name Elements	Simple	Related Element Value Measure +
Street Name Post Type	Street Name Elements	Simple	Spatial Domain Measure +
Street Name Post Type	Street Name Elements	Simple	Tabular Domain Measure
Street Name Pre Directional	Street Name Elements	Simple	Spatial Domain Measure +
Street Name Pre Directional	Street Name Elements	Simple	Tabular Domain Measure
Street Name Pre Modifier	Street Name Elements	Simple	Spatial Domain Measure +
Street Name Pre Modifier	Street Name Elements	Simple	Tabular Domain Measure
Street Name Pre Type	Street Name Elements	Simple	Related Element Value Measure
Street Name Pre Type	Street Name Elements	Simple	Spatial Domain Measure +
Street Name Pre Type	Street Name Elements	Simple	Tabular Domain Measure
Subaddress Element	Subaddress Elements	Complex	Pattern Sequence Measure
Subaddress Element	Subaddress Elements	Complex	Spatial Domain Measure +
Subaddress Identifier	Subaddress Elements	Simple	Range Domain Measure
Subaddress Identifier	Subaddress Elements	Simple	Tabular Domain Measure
Subaddress Type	Subaddress Elements	Simple	Tabular Domain Measure
USPSBox Group ID	USPS Postal Address Elements	Simple	Range Domain Measure
USPSBox Group ID	USPS Postal Address Elements	Simple	Tabular Domain Measure
USPSBox Group Type	USPS Postal Address Elements	Simple	Range Domain Measure
USPSBox Group Type	USPS Postal Address Elements	Simple	Tabular Domain Measure
USPSBox ID	USPS Postal Address Elements	Simple	Range Domain Measure
USPSBox ID	USPS Postal Address Elements	Simple	Tabular Domain Measure
USPSBox Type	USPS Postal Address Elements	Simple	Range Domain Measure
USPSBox Type	USPS Postal Address Elements	Simple	Tabular Domain Measure
USPSGeneral Delivery Point	USPS Postal Address Elements	Simple	Tabular Domain Measure
USPS Address	USPS Postal Address Elements	Complex	Pattern Sequence Measure
USPS Box	USPS Postal Address Elements	Complex	Pattern Sequence Measure
USPS Box	USPS Postal Address Elements	Complex	Tabular Domain Measure
USPS Route	USPS Postal Address Elements	Simple	Pattern Sequence Measure
USPS Route	USPS Postal Address Elements	Simple	Tabular Domain Measure

Element Name	Component or Subject	Simple or Complex	Measure
Zip Code	Place, State, and Country Name Elements	Simple	Spatial Domain Measure +
Zip Code	Place, State, and Country Name Elements	Simple	Tabular Domain Measure
Zip Plus 4	Place, State, and Country Name Elements	Simple	Related Element Value Measure
Zip Plus 4	Place, State, and Country Name Elements	Simple	Tabular Domain Measure

Appendix E (Informative): Attribute Measure Index

Attribute Name	Component or Subject	Measure
Address Anomaly Status	Address Attributes	Tabular Domain Measure
Address Authority	Address ID	Spatial Domain Measure
Address Authority	Address ID	Tabular Domain Measure
Address Classification	Address Attributes	Pattern Sequence Measure
Address Classification	Address Attributes	Tabular Domain Measure
Address Coordinate Reference System	Address Coordinates	Pattern Sequence Measure
Address Coordinate Reference System Authority	Address Coordinates	Tabular Domain Measure
Address Coordinate Reference System ID	Address Coordinates	Related Element Value Measure
Address Coordinate Reference System ID	Address Coordinates	Tabular Domain Measure
Address Direct Source	Address Lineage Attributes	Related Element Value Measure
Address Direct Source	Address Lineage Attributes	Spatial Domain Measure
Address Direct Source	Address Lineage Attributes	Tabular Domain Measure
Address Elevation	Address Coordinates	Address Elevation Measure
Address End Date	Address Lineage Attributes	Future Date Measure
Address End Date	Address Lineage Attributes	Start End Date Order Measure
Address Feature Type	Address Attributes	Address Reference System Description
Address Feature Type	Address Attributes	Address Completeness Measure
Address Feature Type	Address Attributes	Tabular Domain Measure
Address ID	Address ID	Uniqueness Measure
Address Latitude	Address Coordinates	XYCoordinate Completeness Measure
Address Latitude	Address Coordinates	XYCoordinate Spatial Measure
Address Lifecycle Status	Address Attributes	Address Lifecycle Status Date Consistency Measure
Address Lifecycle Status	Address Attributes	Tabular Domain Measure
Address Longitude	Address Coordinates	XYCoordinate Completeness Measure
Address Longitude	Address Coordinates	XYCoordinate Spatial Measure
Address Number Parity	Element Attributes	Address Number Parity Measure
Address Parcel Identifier Source	Address Parcel IDs	Tabular Domain Measure
Address Parcel Identifier	Address Parcel IDs	Pattern Sequence Measure
Address Parcel Identifier	Address Parcel IDs	Uniqueness Measure
Address Range Directionality	Address Range Attributes	Address Range Directionality Measure
Address Range Parity	Address Range Attributes	Address Number Range Parity Consistency Measure
Address Range Side	Address Range Attributes	Address Left Right Measure
Address Range Side	Address Range Attributes	Left Right Odd Even Parity Measure
Address Range Span	Address Range Attributes	Tabular Domain Measure
Address Range Type	Address Range Attributes	Tabular Domain Measure
Address Side Of Street	Address Attributes	Address Left Right Measure
Address Relation Type	Descriptive Attributes	Tabular Domain Measure
Address Start Date	Address Lineage Attributes	Future Date Measure
Address Start Date	Address Lineage Attributes	Start End Date Order Measure
Address Transportation System Name	Address Transportation Feature IDs	Tabular Domain Measure
Address Transportation System Authority	Address Transportation Feature IDs	Tabular Domain Measure
Address Transportation Feature Type	Address Transportation	Address Completeness Measure

Attribute Name	Component or Subject	Measure
	Feature IDs	
Address Transportation Feature Type	Address Transportation Feature IDs	Intersection Validity Measure
Address Transportation Feature Type	Address Transportation Feature IDs	Segment Directionality Consistency Measure
Address Transportation Feature Type	Address Transportation Feature IDs	XYCoordinate Completeness Measure
Address Transportation Feature Type	Address Transportation Feature IDs	XYCoordinate Spatial Measure
Address Transportation Feature ID	Address Transportation Feature IDs	Pattern Sequence Measure
Address Transportation Feature ID	Address Transportation Feature IDs	Uniqueness Measure
Related Transportation Feature ID	Address Transportation Feature IDs	Related Element Uniqueness Measure
Address XCoordinate	Address Coordinates	XYCoordinate Completeness Measure
Address XCoordinate	Address Coordinates	XYCoordinate Spatial Measure
Address YCoordinate	Address Coordinates	XYCoordinate Completeness Measure
Address YCoordinate	Address Coordinates	XYCoordinate Spatial Measure
Address ZLevel	Descriptive Attributes	Tabular Domain Measure
ANSIState County Code	Element Attributes	Spatial Domain Measure
ANSIState County Code	Element Attributes	Tabular Domain Measure
Attached Element	Element Attributes	Check Attached Pairs Measure
Attached Element	Element Attributes	Tabular Domain Measure
Data Set ID	Address Lineage Attributes	Related Not Null Measure
Delivery Address Type	USPS Address Lines	Delivery Address Type Subaddress Measure
Delivery Address Type	USPS Address Lines	Tabular Domain Measure
Element Sequence Number	Element Attributes	Element Sequence Number Measure
Element Sequence Number	Element Attributes	Related Element Uniqueness Measure
Element Sequence Number	Element Attributes	Uniqueness Measure
GNISFeature ID	Element Attributes	Related Not Null Measure
Location Description	Address Attributes	None
Mailable Address	Address Attributes	Related Element Value Measure
Mailable Address	Address Attributes	Tabular Domain Measure
Official Status	Descriptive Attributes	Official Status Address Authority Consistency Measure
Official Status	Descriptive Attributes	Tabular Domain Measure
Place Name Type	Element Attributes	Tabular Domain Measure
Related Address ID	Address ID	Related Element Uniqueness Measure
Related Address ID	Address ID	Related Not Null Measure
Related Address ID	Address ID	Tabular Domain Measure
Subaddress Component Order	Element Attributes	Subaddress Component Order Measure
Subaddress Component Order	Element Attributes	Tabular Domain Measure
USNational Grid Coordinate	Address Coordinates	Usng Coordinate Spatial Measure

Appendix F (Informative): Classification Measure Index

Note: Measures followed by "+" require geospatial data.

Classification Name	Subject	Measure
Community Address	Landmark Address Classes	Pattern Sequence Measure
Community Address	Landmark Address Classes	Spatial Domain Measure +
Four Number Address Range	Thoroughfare Address Classes	Address Number Fishbones Measure +
Four Number Address Range	Thoroughfare Address Classes	Address Number Range Completeness Measure
Four Number Address Range	Thoroughfare Address Classes	Address Number Range Parity Consistency Measure
Four Number Address Range	Thoroughfare Address Classes	Address Number Range Sequence Measure
Four Number Address Range	Thoroughfare Address Classes	Left Right Odd Even Parity Measure
Four Number Address Range	Thoroughfare Address Classes	Low High Address Sequence Measure
Four Number Address Range	Thoroughfare Address Classes	Overlapping Ranges Measure
Four Number Address Range	Thoroughfare Address Classes	Pattern Sequence Measure +
Four Number Address Range	Thoroughfare Address Classes	Range Domain Measure
Four Number Address Range	Thoroughfare Address Classes	Spatial Domain Measure +
General Address Class	General Address Class	Pattern Sequence Measure
Intersection Address	Thoroughfare Address Classes	Intersection Validity Measure
Intersection Address	Thoroughfare Address Classes	Pattern Sequence Measure
Intersection Address	Thoroughfare Address Classes	Spatial Domain Measure +
Landmark Address	Landmark Address Classes	Pattern Sequence Measure
Landmark Address	Landmark Address Classes	Spatial Domain Measure +
Landmark Site Address	Thoroughfare Address Classes	Address Number Fishbones Measure
Landmark Site Address	Thoroughfare Address Classes	Address Completeness Measure
Landmark Site Address	Thoroughfare Address Classes	Left Right Odd Even Parity Measure
Landmark Site Address	Thoroughfare Address Classes	Pattern Sequence Measure
Landmark Site Address	Thoroughfare Address Classes	Spatial Domain Measure +
Numbered Thoroughfare Address	Thoroughfare Address Classes	Address Completeness Measure
Numbered Thoroughfare Address	Thoroughfare Address Classes	Address Number Fishbones Measure +
Numbered Thoroughfare Address	Thoroughfare Address Classes	Address Left Right Measure
Numbered Thoroughfare Address	Thoroughfare Address Classes	Pattern Sequence Measure
Numbered Thoroughfare Address	Thoroughfare Address Classes	Range Domain Measure
Numbered Thoroughfare Address	Thoroughfare Address Classes	Spatial Domain Measure
Two Number Address Range	Thoroughfare Address Classes	Address Number Range Completeness Measure
Two Number Address Range	Thoroughfare Address Classes	Address Number Range Parity Consistency Measure
Two Number Address Range	Thoroughfare Address Classes	Address Number Range Sequence Measure
Two Number Address Range	Thoroughfare Address Classes	Low High Address Sequence Measure
Two Number Address Range	Thoroughfare Address Classes	Low High Address Sequence Measure
Two Number Address Range	Thoroughfare Address Classes	Overlapping Ranges Measure
Two Number Address Range	Thoroughfare Address Classes	Pattern Sequence Measure +
Two Number Address Range	Thoroughfare Address Classes	Range Domain Measure
USPS General Delivery Office	Landmark Address Classes	Pattern Sequence Measure
USPS Postal Delivery Box	Postal Delivery Address Classes	Pattern Sequence Measure
USPS Postal Delivery Route	Postal Delivery Address Classes	Pattern Sequence Measure
Unnumbered Thoroughfare Address	Thoroughfare Address Classes	Address Number Fishbones Measure+
Unnumbered Thoroughfare Address	Thoroughfare Address Classes	Pattern Sequence Measure
Unnumbered Thoroughfare Address	Thoroughfare Address Classes	Spatial Domain Measure +

Appendix G (Informative): Quality Measures By Data Quality Report

Measure	Attribute (Thematic) Accuracy	Completeness	Lineage	Logical Consistency	Positional Accuracy	Temporal Accuracy
Address Completeness Measure		•				
Address Elevation Measure	•					
Address Left Right Measure				•		
Address Lifecycle Status Date Consistency Measure				•		•
Address Number Fishbones Measure				•		
Address Number Parity Measure				•		
Address Number Range Completeness Measure				•		
Address Number Range Parity Consistency Measure				•		
Address Number Range Sequence Measure				•		
Address Range Directionality Measure				•		
Address Reference System Axes Point Of Beginning Measure				•		
Address Reference System Rules Measure				•		
Check Attached Pairs Measure				•		
Complex Element Sequence Number Measure	•					
Data Type Measure				•		
Delivery Address Type Subaddress Measure				•		
Duplicate Street Name Measure				•		
Element Sequence Number Measure	•					
Future Date Measure	•					•
Intersection Validity Measure				•		
Left Right Odd Even Parity Measure				•		
Location Description Field Check Measure			•		•	
Low High Address Sequence Measure				•		
Official Status Address Authority Consistency Measure				•		

Measure	Attribute (Thematic) Accuracy	Completeness	Lineage	Logical Consistency	Positional Accuracy	Temporal Accuracy
Overlapping Ranges Measure				•		
Pattern Sequence Measure				•		
Range Domain Measure				•		
Related Element Uniqueness Measure	•					
Related Element Value Measure				•		
Related Not Null Measure				•		
Segment Directionality Consistency Measure				•		
Spatial Domain Measure					•	
Start End Date Order Measure	•					•
Subaddress Component Order Measure	•					
Tabular Domain Measure	•					
Uniqueness Measure	•					
USNG Coordinate Spatial Measure					•	
XY Coordinate Completeness Measure				•		
XY Coordinate Spatial Measure					•	

Appendix H: Normative XSD

The Address Standard XML Schema Definition is broken into 2 parts. The first part contains element definitions and corresponds to Part One of the Standard. The second part contains the Address Class definitions and corresponds to Part Two of the Standard.

addr_type.xsd

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema targetNamespace="addr_type"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:addr_type="addr_type"
  xmlns:gml="http://www.opengis.net/gml">

  <!-- Draft Address Standard, version 0.4.2 being prepared and tested by
      a Working Group coordinated by URISA and NENA and the Census Bureau for
      submittal
      to the FGDC. -->

  <!-- During the initial draft period the rddl can be found at
      http://www.urisa.org/files/addr_std/0.4.2/addr_type.xsd -->

  <xsd:import namespace="http://www.opengis.net/gml"
    schemaLocation="base/gml.xsd">
    <xsd:annotation>
      <xsd:documentation>
        GML 3.1.1 from OpenGeospatial Consortium
      </xsd:documentation>
    </xsd:annotation>
  </xsd:import>

  <xsd:simpleType name="version_type">
    <xsd:annotation>
      <xsd:documentation xml:lang="en">
        The ID for this version
        of the Address Standard.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:token">
      <xsd:enumeration value='0.4' />
    </xsd:restriction>
  </xsd:simpleType>

  <xsd:simpleType name="Separator_type">
    <xsd:annotation>
      <xsd:documentation xml:lang="en">
        A word, phrase, or symbol used as a separator between components of a
        complex element or class. The Separator Element is required for
        Intersection Addresses and for Two Number Address Ranges, and it may
        be used in constructing a Complete Street Name.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
      <xsd:pattern value='.*' />
    </xsd:restriction>
  </xsd:simpleType>

  <xsd:simpleType name="CornerOf_type">
```

```
<xsd:annotation>
  <xsd:documentation xml:lang="en">
    A directional word
    describing a corner formed by the intersection of two thoroughfares.
  </xsd:documentation>
</xsd:annotation>
<xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:simpleType name="ElementSequenceNumber_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The order in which the
      elements of a Complete Subaddress,
      Complete Landmark Name, or
      Complete Place Name should be written.
    </xsd:documentation>
  </xsd:annotation>
<xsd:restriction base="xsd:integer" />
</xsd:simpleType>

<xsd:simpleType name="GNISFeatureID_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      "A permanent, unique
      number assigned to a geographic feature for the
      sole purpose of
      uniquely identifying that feature as a record in any
      information
      system database, dataset, file, or document and for
      distinguishing it
      from all other feature records so identified. The
      number is assigned
      sequentially (highest existing number plus one)
      to
      new records as they
      are created in the Geographic Names Information
      System."
    </xsd:documentation>
  </xsd:annotation>
<xsd:restriction base="xsd:integer" />
</xsd:simpleType>

<xsd:complexType name="AddressNumberPrefix_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en"> The portion of the
```

Complete Address Number which precedes the Address Number itself.

```
</xsd:documentation>

</xsd:annotation>

<xsd:simpleContent>

  <xsd:extension base="xsd:string">
    <xsd:attribute name="Separator" type="addr_type:Separator_type" />
  </xsd:extension>
</xsd:simpleContent>

</xsd:complexType>

<xsd:simpleType name="AddressNumber_type">

  <xsd:annotation>
    <xsd:documentation xml:lang="en">The numeric identifier
      for a land parcel, house, building or other location along a
      thoroughfare or within a community.
  </xsd:annotation>

  1. The Address Number is defined as an integer to support address
  sorting, parity (even/odd) definition, and in/out of address range
  tests. 2. The Address Number must be converted to a characterString
  when it is combined with the prefix and suffix into a Complete
  Address Number. 3. Some addresses may contain letters, fractions,
  hyphens, decimals and other non-integer content within the Complete
  Address Number. Those non-integer elements should be placed in the
  Address Number Prefix if they appear before the Address Number, or
  in the Address Number Suffix if they follow the Address Number. For
  example, if the New York City hyphenated address 194-03 ½ 50th
  Avenue, New York, NY 11365 were to be parsed rather than represented
  as a Complete Address Number: ---the Address Number Prefix would be
  "194-" (including the hyphen), ---the Address Number would be 3
  (converted to "03" (text) in constructing the Complete Address
  Number), ---and the Address Number Suffix would be "1/2". 4. Special
```

care should be taken with records where the Address Number is 0 (zero). Occasionally zero is issued as a valid address number (e.g. Zero Prince Street, Alexandria, VA 22314) or it can be imputed (1/2 Fifth Avenue, New York, NY 10003 (for which the Address Number would be 0 and the Address Number Suffix would be "1/2")). More often, though, zero is shown because the Address Number is either missing or non-existent, and null value has been converted to zero.

5. Address Numbers vs. Address "Letters". In rare instances, thoroughfare addresses may be identified by letters instead of numbers (for example, "A" Main Street, "B" Main Street, "C" Main Street, "AA" Main Street, "AB" Main Street, etc.) A few thousand such cases have been verified in Puerto Rico, and others may be found elsewhere. In such cases, the letter(s) cannot be treated as an Address Number, because an Address Number must be an integer. The letter(s) also cannot be an Address Number Prefix or Address Number Suffix, because neither of those can be created except in conjunction with an Address Number. Instead, the letter(s) should be treated a Subaddress Identifier in an Unnumbered Thoroughfare Address. (For example: Complete Street Name = "Calle Sanchez", Complete Subaddress Identifier = "AB", Complete Place Name = "Mayaguez" State Name = "PR"). As an alternative, the address may be classified in the General Address Class and treated accordingly.

</xsd:documentation>

</xsd:annotation>

<xsd:restriction base="xsd:string">

<xsd:pattern value='[0-9]+' />

</xsd:restriction>

</xsd:simpleType>

```
<xsd:complexType name="AddressNumberSuffix_type">  
  <xsd:annotation>  
    <xsd:documentation xml:lang="en">The portion of the  
      Complete Address Number which follows the Address Number itself. 1.  
      This element is not found in most Complete Address Numbers. When  
      found, it should be separated from the Address Number so that the  
      Address Number can be maintained as an integer for sorting and  
      quality control tests. 2. Informally an Address Number and Address  
      Number Suffix may be written with or without a space between them.  
      Within this standard, the default assumption is that an empty space  
      separates elements unless stated otherwise. The Attached Element can  
      be used to indicate where the assumed space between the Address  
      Number and Address Number Suffix has been omitted within an address  
      file (see Attached Element for additional notes). 3. If a hyphen  
      appears between the Address Number and the Address Number Suffix,  
      the hyphen is included in the Address Number Suffix. 4. When  
      milepost Complete Address Numbers include decimal fractions, the  
      integer portion of the milepost number is treated as the Address  
      Number, and the fraction (including the decimal point) is treated as  
      an Address Number Suffix. (See Complete Address Number for  
      additional notes on milepost address numbers.) </xsd:documentation>  
  </xsd:annotation>  
  <xsd:simpleContent>  
    <xsd:extension base="xsd:string">  
      <xsd:attribute name="Separator" type="addr_type:Separator_type" />  
    </xsd:extension>  
  </xsd:simpleContent>  
</xsd:complexType>  
  
<!-- StreetName Content -->
```

```
<xsd:complexType name="StreetNamePreModifier_type">

  <xsd:annotation>
    <xsd:documentation xml:lang="en">A word or phrase in a
      Complete Street Name that 1. Precedes and modifies the Street Name,
      but is separated from it by a Street Name Pre Type or a Street Name
      Pre Directional or both, or 2. Is placed outside the Street Name so
      that the Street Name can be used in creating a sorted (alphabetical
      or alphanumeric) list of street names. </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:string">
      <xsd:attribute name="Separator"
      type="addr_type:Separator_type"></xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:complexType name="StreetNamePreDirectional_type">

  <xsd:annotation>
    <xsd:documentation xml:lang="en">A word preceding the
      Street Name that indicates the direction or position of the
      thoroughfare relative to an arbitrary starting point or line, or the
      sector where it is located. </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:string">
      <xsd:attribute name="Separator"
      type="addr_type:Separator_type"></xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:complexType name="StreetNamePreType_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">A word or phrase that
```

```
precedes the Street Name and identifies a type of thoroughfare in a
Complete Street Name. </xsd:documentation>
</xsd:annotation>
<xsd:simpleContent>
  <xsd:extension base="xsd:string">
    <xsd:attribute name="Separator" type="addr_type:Separator_type">
      </xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:simpleType name="StreetName_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Official name of a
      street as assigned by a local
      governing authority, or an alternate
      (alias) name that
      is used and recognized, excluding street types,
      directionals, and modifiers.
    </xsd:documentation>
  </xsd:annotation>
</xsd:simpleType>
```

1. Each jurisdiction should establish
its own list of
street names and use it as a domain of values to
validate addresses. Alternate and Official names are
distinguished by
the address attribute "Alias Status
Attribute"

2. Local addressing
authorities are urged to follow
consistent internal street naming
practices, and to
resolve internal street name inconsistencies,

especially
for numbered streets ("Twentieth" or "20th" ?), internal
capitalization ("McIntyre" or "Mcintyre" ?), hyphens,
and
apostrophes.

3. If alternate or abbreviated versions of street names
are needed for a specialized purpose such as mailing or
emergency
dispatch, they can be created in views or
export routines.

```
</xsd:documentation>

</xsd:annotation>

<xsd:restriction base="xsd:string">
  <xsd:pattern value='.*' />
</xsd:restriction>

</xsd:simpleType>

<xsd:complexType name="StreetNamePostModifier_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">A word or phrase in a
      Complete Street Name that follows and modifies the Street Name, but
      is separated from it by a Street Name Post Type or a Street Name
      Post Directional or both. </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:string">
      <xsd:attribute name="Separator"
type="addr_type:Separator_type"></xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:complexType name="StreetNamePostDirectional_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">A word preceding the
      Street Name that indicates the direction or position of the
      thoroughfare relative to an arbitrary starting point or line, or the
      sector where it is located. </xsd:documentation>
```

```
</xsd:annotation>
<xsd:simpleContent>
  <xsd:extension base="xsd:string">
    <xsd:attribute name="Separator"
type="addr_type:Separator_type"></xsd:attribute>
  </xsd:extension>
</xsd:simpleContent>
</xsd:complexType>

<xsd:complexType name="StreetNamePostType_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">A word or phrase that
      follows the Street Name and identifies a type of thoroughfare in a
      Complete Street Name. </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:string">
      <xsd:attribute name="Separator" type="addr_type:Separator_type">
      </xsd:attribute>
      <xsd:attribute name="NewAttribute" type="xsd:string"></xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<!-- Occupancy Types -->

<xsd:simpleType name="SubaddressComponentOrder_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The order in which
      SubaddressType and
      SubaddressIdentifier appear within an
      SubaddressElement when expressed as text. "Apartment 7"
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:integer">
    <xsd:enumeration value="1">
      <xsd:annotation>
        <xsd:documentation>SubaddressType first, then SubaddressIdentifier
          (or: SubaddressElement does not include an SubaddressType).
          Example: "Floor 7"</xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="2">
      <xsd:annotation>
        <xsd:documentation>SubaddressIdentifier first, then SubaddressType.
          Example: "Empire Room"</xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="3">
      <xsd:annotation>
        <xsd:documentation>Order is not known or unstated.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
  </xsd:restriction>
</xsd:simpleType>
```

```
<xsd:simpleType name="SubaddressType_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      This is a modifier to
      the SubaddressIdentifier element and this
      cannot exist without it.
      The type of structure (when
      several structures are found at the same
      address), e.g.,
      Apartment, Tower, Block. Used with Building
      Identifier
      to designate one of several structures at a given site.
      Fits within the general USPS definition of a "secondary
      address
      designator" and EPA definitions of "secondary
      address identifier"
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:simpleType name="SubaddressIdentifier_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The letters, numbers,
      words or combination thereof used
      to distinguish one structure from
      another when several
      occur at the same address.

      Used with
      SubaddressType to designate one of several
      structures at a given
      site. Fits within the USPS
      definition of a "secondary address
      designator" and the
      general EPA definition of "secondary address
      identifier"
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:complexType name="SubaddressElement_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A single combination of
      SubaddressType and
      SubaddressIdentifier (or, in some cases, a
      SubaddressIdentifier alone), which, alone or in
      combination with
      other SubaddressElements, distinguishes
      one subaddress within or
      between structures from another
      when several occur within the same
```

```
feature. See
CompleteSubaddress for a definition of "subaddress."
</xsd:documentation>
</xsd:annotation>
<xsd:sequence>
  <xsd:element name="SubaddressType" type="addr_type:SubaddressType_type"
    maxOccurs="1" minOccurs="0" />
  <xsd:element name="SubaddressIdentifier"
    type="addr_type:SubaddressIdentifier_type"
    maxOccurs="1" minOccurs="1" />
</xsd:sequence>
<xsd:attribute name="ElementSequenceNumber"
  type="addr_type:ElementSequenceNumber_type" />
<xsd:attribute name="SubaddressComponentOrder"
  type="addr_type:SubaddressComponentOrder_type" />
<xsd:attribute name="Separator" type="addr_type:Separator_type" />
<xsd:attribute name="GNISFeatureID"
  type="addr_type:GNISFeatureID_type"></xsd:attribute>
</xsd:complexType>

<!-- Landmark Name Type -->

<xsd:complexType name="LandmarkName_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The name by which a
      prominent feature is publicly known.

      Landmarks usually have a street
      address. A landmark name
      does not imply official historic landmark
      status, but
      simply a commonly used name that substitutes for an
      address number and street name in identifying the
      location of a
      specific building or feature. Generally
      the use of a landmark's
      street address is preferable
      because it is unambiguous. All landmark
      names should be
      cross-referenced to a street address or other
      coordinate
      location.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:string">
      <xsd:attribute name="ElementSequenceNumber"
        type="addr_type:ElementSequenceNumber_type" />
      <xsd:attribute name="GNISFeatureID" type="addr_type:GNISFeatureID_type"
    />
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>

<!-- Area and Zone Elements -->
```

```
<xsd:simpleType name="CommunityPlaceName_type">

  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A named area, sector,
      or development that is not an
      incorporated municipality or other
      governmental unit,
      such as a neighborhood in a city, or a rural
      settlement
      in unincorporated area. Often called "urbanization" in
      Puerto Rican addressing usage.
    </xsd:documentation>
  </xsd:annotation>
</xsd:simpleType>
```

1. "Urbanizacion", commonly used in
urban areas of
Puerto Rico, is an important part of the address.

Street
names and address ranges are often repeated in a city,
especially where a city has annexed older towns; they
are
distinguished by their urbanizacion or community
name.

2. Certain
other words can be used in place of
"urbanizacion": extenciones,
mansiones, reparto, villa,
parque, jardine, altura, alturas, colinas,
estancias,

extension, quintas, sector, terraza, villa, villas.

3. For

more information on Puerto Rican addressing conventions, see USPS Publication 28 Section 29, and USPS "Addressing Standards for Puerto Rico and the Virgin Islands".

```
</xsd:documentation>
</xsd:annotation>
<xsd:restriction base="xsd:string">
  <xsd:pattern value='.' />
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="PlaceNameType_type">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="USPSCommunity">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The name given by the
          U.S. Postal Service to the
          post office from which mail is delivered
          to the
          address. In many places this will be different
          from the name
          of the municipality in which the
          address is physically located.

          The
          name given by the U.S. Postal Service to the
          post office from which
          mail is delivered to the
          address. In many places this will be
          different
          from the name of the incorporated municipality
          in which
          the address is physically located.
      </xsd:documentation>
```

```
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="MunicipalJurisdiction">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The name of the
      municipality (city, township, or
      other non-county local government)
      in which the
      address is physically located. In many places
      this will
      be different than the city name used
      by the U.S. Postal Service.

      Required by most local governments for tax and
      services
      determinations. This will be null for
      addresses in unincorporated
      portions of
      counties.
    </xsd:documentation>
  </xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="County">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The primary
      administrative subdivision of a
      state in the United States.
    </xsd:documentation>
  </xsd:annotation>
</xsd:enumeration>
<xsd:pattern value=".+"></xsd:pattern>
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="StateName_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The primary legal
      subdivision of the United States,
      represented by its two letter USPS
      abbreviation.
    </xsd:documentation>
  </xsd:annotation>
</xsd:simpleType>
```

This is the only element stored in abbreviated form.

```
</xsd:documentation>

</xsd:annotation>

<xsd:restriction base="xsd:token">

    <!-- "US State and The District of Columbia" Abbreviations -->

    <xsd:pattern value='.*' />

</xsd:restriction>

</xsd:simpleType>

<xsd:simpleType name="ZipCode_type">

    <xsd:annotation>

        <xsd:documentation xml:lang="en">

            A five-digit code that

            identifies a specific pseudo

            geographic delivery area. ZIP Codes can

            represent an

            area within a state, an area that crosses state

            boundaries (unusual condition) or a single building or

            company that

            has a very high mail volume. "ZIP" is an

            acronym for Zone Improvement

            Plan. Zero pad from the

            left to fill the range as in 01776.

        </xsd:documentation>

    </xsd:annotation>

    <xsd:restriction base="xsd:string">

        <xsd:pattern value='[0-9]{5}' />

    </xsd:restriction>

</xsd:simpleType>
```

```
<xsd:simpleType name="ZipPlus4_type">  
  
  <xsd:annotation>  
    <xsd:documentation xml:lang="en">  
      A four-digit extension  
      of the five-digit Zip Code that  
      identifies a portion of a carrier  
      route for USPS mail  
      delivery. Zero pad from the left to fill the  
      range as in  
      0030.
```

```
    </xsd:documentation>  
  </xsd:annotation>  
  <xsd:restriction base="xsd:string">  
    <xsd:pattern value='[0-9]{4}' />  
  </xsd:restriction>  
</xsd:simpleType>
```

```
<xsd:simpleType name="CountryName_type">  
  <xsd:annotation>  
    <xsd:documentation xml:lang="en">  
      The name of the country  
      in which the address is located.
```

1. Although the scope of this standard is restricted to US addresses, this item is included for two reasons: to facilitate reconciliation with address standards of

other nations, and to accommodate files which mix addresses from the US and other countries. 2. ISO 3166-1 official short English names are specified because they a familiar and concise, and because ISO 3166-1 is specified in the UPU address standard. 3. The names can be found at:
<http://www.iso.org/iso/en/prods-services/iso3166ma/02iso-3166-code-lists/list-en1.html>

```
</xsd:documentation>
</xsd:annotation>
<xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:simpleType name="USPSBoxType_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A box used for receipt of USPS mail. The box may be located in the post office lobby (e.g PO Box), on the customer's premises or other USPS authorized place (e.g. rural route box).
    </xsd:documentation>
  </xsd:annotation>
```

```
<xsd:restriction base="xsd:string">
  <xsd:pattern value='.*' />
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="USPSBoxId_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The numbers or letters
      distinguishing one box from
      another within a post office. May include
      slash, hyphen
      or period.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
  </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="USPSBox_type">
  <xsd:annotation>
    <xsd:documentation>A container for the receipt of USPS mail uniquely
    identified by the combination of a USPS Box Type and a USPS Box ID.
  </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="USPSBoxType" type="addr_type:USPSBoxType_type"
      maxOccurs="1" minOccurs="1" />
```

```
<xsd:element name="USPSBoxId" type="addr_type:USPSBoxId_type"
  maxOccurs="1" minOccurs="1" />

</xsd:sequence>
</xsd:complexType>

<xsd:simpleType name="USPSBoxGroupType_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A collection of postal
      boxes served from a single
      distribution point.

      This group includes
      rural routes, highway contract
      routes, postal service centers,
      overseas military common
      mail rooms and military unit numbers.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value=".*" />
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="USPSBoxGroupId_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The numbers or letters
      distinguishing one group of boxes
    </xsd:documentation>
  </xsd:annotation>
```

```
        from another within a distribution
        point. May include
        hyphen, slash or period.

    </xsd:documentation>

</xsd:annotation>

<xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
</xsd:restriction>

</xsd:simpleType>

<xsd:complexType name="USPSRoute_type">
    <xsd:sequence>
        <xsd:element name="USPSBoxGroupType"
type="addr_type:USPSBoxGroupType_type"
            maxOccurs="1" minOccurs="1" />
        <xsd:element name="USPSBoxGroupId" type="addr_type:USPSBoxGroupId_type"
            maxOccurs="1" minOccurs="1" />
    </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="USPSAddress_type">
    <xsd:sequence>
        <xsd:element name="USPSRoute" type="addr_type:USPSRoute_type"
            maxOccurs="1" minOccurs="1" />
        <xsd:element name="USPSBox" type="addr_type:USPSBox_type"
            maxOccurs="1" minOccurs="1" />
    </xsd:sequence>
</xsd:complexType>

<xsd:simpleType name="USPSGeneralDeliveryPoint_type">
    <xsd:annotation>
        <xsd:documentation xml:lang="en">
            A central point where
            mail may be picked up by the
        </xsd:documentation>
    </xsd:annotation>

```

addressee. Two values are permitted:

"General Delivery"

(for post offices), and ship's names (for overseas military addresses).

```
</xsd:documentation>
```

```
</xsd:annotation>
```

```
<xsd:restriction base="xsd:string">
```

```
<xsd:pattern value='.*' />
```

```
</xsd:restriction>
```

```
</xsd:simpleType>
```



```
<xsd:simpleType name="AddressAuthorityIdentifiertype_old">
```

```
<xsd:annotation>
```

```
<xsd:documentation xml:lang="en">
```

A Concatenation of

codes found in FIPS 5-2, 6-4, and

55-3 data guides, with a locally

defined code that MUST

be defined in the metadata. The general format

is

(expressed as regular expressions)

[0-9]{2}[0-9]{3}[0-9]{5}[0-9]{4}.

```
</xsd:documentation>
```

```
</xsd:annotation>
```

```
<xsd:restriction base="xsd:string">
```

```
<xsd:pattern value='.*' />
```

```
</xsd:restriction>
```

```
</xsd:simpleType>
```

```
<!-- Locational type -->

<xsd:simpleType name="AddressXCoordinate_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The X coordinate of the
      address location.</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:double" />
</xsd:simpleType>

<xsd:simpleType name="AddressYCoordinate_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The Y coordinate of the
      address location.</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:double" />
</xsd:simpleType>

<xsd:simpleType name="AddressLongitude_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The longitude
      coordinate of the address location, noted
      in decimal degrees. For
      point and polygon features,
      coordinate pairs typically locate the
      point of
    </xsd:documentation>
  </xsd:annotation>
</xsd:simpleType>
```

```
assignment: a centroid point, a point locating the entry
to a
property, etc.

</xsd:documentation>

</xsd:annotation>

<xsd:restriction base="xsd:double" />

</xsd:simpleType>

<xsd:simpleType name="AddressLatitude_type">
<xsd:annotation>
<xsd:documentation xml:lang="en">
The latitude coordinate
of the address location, noted
in decimal degrees. For point and
polygon features,
coordinate pairs typically locate the point of
assignment: a centroid point, a point locating the entry
to a
property, etc.

</xsd:documentation>

</xsd:annotation>

<xsd:restriction base="xsd:double" />

</xsd:simpleType>

<xsd:simpleType name="LocationUSNG_type">
<xsd:annotation>
<xsd:documentation xml:lang="en">
The USNG or US National
Grid is an alphanumeric
```

reference system that overlays the Universal Transverse Mercator (UTM) numerical coordinate system. A USNG coordinate consists of three parts, the:

1. Grid Zone Designation

(GZD) for worldwide unique geoaddresses (two digits plus one letter, developed from the UTM system).

2. 100,000-meter Square Identification

for regional areas (two letters).

3. Grid Coordinates for local areas

(always an even number of digits between 2 and 10 depending upon precision necessary to uniquely identify the location).

Look to

www.fgdc.gov/standards/status/usng.html for a normative definition.

Adapted from US National Grid, FDGC-STD-011-2001, Section 3.3

```
</xsd:documentation>  
</xsd:annotation>  
<xsd:restriction base="xsd:string">  
  <xsd:pattern value='.*' />  
</xsd:restriction>
```

```
</xsd:simpleType>

<xsd:simpleType name="AddressElevation_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">Distance of the address
      in specified units above or below a vertical datum, as defined by a
      specified coordinate reference system. </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:double" />
</xsd:simpleType>

<xsd:simpleType name="AddressZLevel_type">

  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Floor or level of the
      structure. The lowest level of a building is 1, and ascending
      numbers are assigned in order to each higher level.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressCoordinateReferenceSystemID_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">A name or number which,
      along with the Address Coordinate Reference System Authority,
      identifies the coordinate reference system to which Address X
      Coordinate and Address Y Coordinate, Address Latitude and Address
      Longitude, US National Grid Coordinate, or Address Elevation values
      are referenced. </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:integer" />
</xsd:simpleType>

<xsd:simpleType name="AddressCoordinateReferenceSystemAuthority_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The Authority that
      assigns the unique Address Coordinate Reference System ID (number or
      name) to the Address Coordinate Reference System to which the
      Address X Coordinate and Address Y Coordinate, Address Latitude and
      Address Longitude, US National Grid Coordinate, or Address Elevation
      are referenced. </xsd:documentation>
  </xsd:annotation>
```

```
</xsd:annotation>
<xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:complexType name="AddressCoordinateReferenceSystem_type">
<xsd:sequence>
<xsd:element name="AddressCoordinateReferenceSystemAuthority"
  type="addr_type:AddressCoordinateReferenceSystemAuthority_type" />
<xsd:element name="AddressCoordinateReferenceSystemID"
  type="addr_type:AddressCoordinateReferenceSystemID_type"></xsd:element>
</xsd:sequence>
</xsd:complexType>

<!-- Non Locational Elements -->

<xsd:simpleType name="AddressID_type">

  <xsd:annotation>
    <xsd:documentation xml:lang="en">The unique
      identification number assigned to an address by the addressing
      authority. The ID number must be unique for each address assigned by
      an addressing authority.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressReferenceSystemId_type">
<xsd:annotation>
  <xsd:documentation xml:lang="en">A unique identifier of
    the Address Reference System for a specified area (Address Reference
    System Extent). </xsd:documentation>
</xsd:annotation>
<xsd:restriction base="xsd:integer" />
</xsd:simpleType>

<xsd:simpleType name="AddressReferenceSystemName_type">
<xsd:annotation>
  <xsd:documentation xml:lang="en">The name of the address
    system used in a specified area (Address Reference System Extent).
  </xsd:documentation>
</xsd:annotation>
<xsd:restriction base="xsd:string" />
```

```
</xsd:simpleType>

<xsd:simpleType name="AddressReferenceSystemAuthority_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The Authority that
      assigns the unique Address Coordinate Reference System ID (number or
      name) to
      the Address Coordinate Reference System to which the Address
      X
      Coordinate and Address Y
      Coordinate, Address Latitude and Address
      Longitude, US National Grid
      Coordinate, or Address Elevation are
      referenced.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:complexType name="AddressReferenceSystemExtent_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">Boundary of the area(s)
      within which an Address Reference System is used.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:restriction base="gml:MultiSurfaceType" />
  </xsd:complexContent>
</xsd:complexType>

<xsd:simpleType name="AddressReferenceSystemType_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The category of address
      reference system in use. The
      type of reference system determines and
      guides the
      assignment of numbers within the Address Reference
      System
      Extent.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Axial"></xsd:enumeration>
    <xsd:enumeration value="Grid"></xsd:enumeration>
    <xsd:enumeration value="Radial"></xsd:enumeration>
    <xsd:enumeration value="Linear Non-Axial"></xsd:enumeration>
    <xsd:enumeration value="Distance"></xsd:enumeration>
    <xsd:enumeration value="Area Based"></xsd:enumeration>
  </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="AddressReferenceSystemRules_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The rules by which
      address numbers, street names and
```

```
other components of a thoroughfare
address are
determined.
</xsd:documentation>
</xsd:annotation>
<xsd:sequence>
  <xsd:element name="AddressReferenceSystemBlockRules"
    type="addr_type:AddressReferenceSystemBlockRules_type" minOccurs="0"
    maxOccurs="unbounded"></xsd:element>
  <xsd:element name="AddressReferenceSystemNumberingRules"
    type="addr_type:AddressReferenceSystemNumberingRules_type"
    minOccurs="0" maxOccurs="unbounded"></xsd:element>
  <xsd:element name="AddressReferenceSystemStreetNamingRules"
    type="addr_type:AddressReferenceSystemStreetNamingRules_type"
    minOccurs="0" maxOccurs="unbounded"></xsd:element>
  <xsd:element
    name="AddressReferenceSystemStreetTypeDirectionalAndModfierRules"
    type="addr_type:AddressReferenceSystemStreetTypeDirectionalAndModifierRules_
    type"
    minOccurs="0" maxOccurs="unbounded"></xsd:element>
  <xsd:element
    name="AddressReferenceSystemPlaceNameStateCountyAndZipCodeRules"
    type="addr_type:AddressReferenceSystemPlaceNameStateCountryAndZipCodeRules_t
    ype"
    minOccurs="0" maxOccurs="unbounded"></xsd:element>
  <xsd:element name="AddressReferenceSystemSubaddressRules"
    type="addr_type:AddressReferenceSystemSubaddressRules_type"
    minOccurs="0" maxOccurs="unbounded"></xsd:element>
</xsd:sequence>
</xsd:complexType>

<xsd:simpleType name="AddressReferenceSystemBlockRules_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">This element defines a
      block in an Address Reference System, and sets forth the rules for
      block ranges and block breaks. </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:simpleType name="AddressReferenceSystemNumberingRules_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The rules for numbering
      along a thoroughfare, including parity (odd/even side definition),
      and numbering increment distance and value.</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:simpleType name="AddressReferenceSystemStreetNamingRules_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The rules for the
      selection and use of street names within an Address Reference System
    </xsd:documentation>
  </xsd:annotation>
```

```
<xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:simpleType
  name="AddressReferenceSystemStreetTypeDirectionalAndModifierRules_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">Rules pertaining to the
      use of street types (suffix and prefix), directionals (prefix and
      suffix), and modifiers (prefix and suffix) of street names.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:simpleType
  name="AddressReferenceSystemPlaceNameStateCountryAndZipCodeRules_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">This element contains
      rules for the use of place names, state names, country names, and
      ZIP Codes within the jurisdiction of an Address Authority.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:simpleType name="AddressReferenceSystemSubaddressRules_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The rules that are
      applied to the addressing of areas within structures as subaddresses
      (units, suites, apartments, spaces, etc.) within a given Address
      Reference System</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:complexType name="AddressReferenceSystemAxis_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The line that defines
      the points of origin for address numbering along thoroughfares that
      intersect it, or which are numbered in parallel to streets that
      intersect it. It may be a road, another geographic feature, or an
      imaginary line.</xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:restriction base="gml:MultiCurveType">
      </xsd:restriction>
    </xsd:complexContent>
  </xsd:complexType>

<xsd:complexType name="AddressReferenceSystemAxisPointOfBeginning_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">Coordinate location of
      the beginning point of address numbering along an Address Reference
      System Axis. </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="gml:PointType"></xsd:extension>
```

```
</xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="AddressReferenceSystemGridAngle_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The degree to which a
      specific, named address grid is tilted off a north/south or
      east/west orientation. </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="xsd:double"></xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="AddressReferenceSystemReferencePolyline_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">A street, geometric
      line, or other line used to measure address number assignment
      intervals and ranges within an Address Reference System. The Address
      Reference System Reference Polyline may consist of a beginning
      point, one or more segments of a street centerline, geographically
      identified line, such as a line of latitude or longitude, a
      land-division based line, such as a township, range, or section
      line, or an imaginary line constructed for the purpose of allocating
      address ranges and address numbers.</xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:restriction base="gml:MultiCurveType"></xsd:restriction>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="AddressReferenceSystemRangeBreakpoint_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">A point along a street
      or other thoroughfare within an Address Reference System where an
      address range beginning and/or endpoint is located.
  </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="gml:PointType">
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="AddressReferenceSystemRangeBreakline_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">A line connecting the
      Address Reference System Range Breakpoints with the same value
      within an Address Reference System</xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:restriction base="gml:MultiCurveType">
      </xsd:restriction>
    </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="AddressReferenceSystemRangePolygon_type">
```

```
<xsd:annotation>
  <xsd:documentation xml:lang="en">A line connecting the
    Address Reference System Range Breakpoints with the same value
    within an Address Reference System</xsd:documentation>
</xsd:annotation>
<xsd:complexContent>
  <xsd:restriction base="gml:MultiSurfaceType">
    </xsd:restriction>
</xsd:complexContent>
</xsd:complexType>

<xsd:simpleType name="AddressReferenceSystemReferenceDocumentCitation_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">A bibliographic
      reference to an ordinance, map, manual, or other document in which
      the rules governing an Address Reference System are written.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:complexType name="AddressReferenceSystem_type">
  <xsd:annotation>
    <xsd:documentation>An Address Reference System is a set of rules and
      geometries that define how addresses are
      assigned along thoroughfares
      and/or within a given area (Address Reference
      System Extent).
      At
      minimum, an Address Reference System must specify where Complete
      Address Number sequences
      begin and how Complete Address Numbers are
      assigned along the length of
      thoroughfares governed by
      the Address
      Reference System within the Address Reference System
      Extent. Address
      Reference Systems
      typically provide rules governing left-right parity
      of Complete Address
      Numbers, assignment of Street Names
      and street
      types, use of directionals and quadrants, and other aspects
      of
      address assignment.
      An Address
      Reference System that is based on axis
      lines, an Address Reference System
      Axis defined for each axis used
      to
      define address assignment. Each Address Reference System Axis must
      have an identified Address Reference
      System Axis Point Of Beginning.
      An Address Reference System is known by
      its Address Reference System
      Name (required). Additional business rules for an Address Reference
      System are described in the Address Reference
      System Rules.
    </xsd:documentation>
  </xsd:annotation>
</xsd:complexType>
```

```
</xsd:documentation>
</xsd:annotation>
<xsd:sequence>
  <xsd:element name="AddressReferenceSystemId"
    type="addr_type:AddressReferenceSystemId_type" maxOccurs="1"
    minOccurs="1" />
  <xsd:element name="AddressReferenceSystemName"
    type="addr_type:AddressReferenceSystemName_type" maxOccurs="1"
    minOccurs="1" />
  <xsd:element name="AddressReferenceSystemAuthority"
    type="addr_type:AddressReferenceSystemAuthority_type" maxOccurs="1"
    minOccurs="0" />
  <xsd:element name="AddressReferenceSystemExtent"
    type="addr_type:AddressReferenceSystemExtent_type" maxOccurs="1"
    minOccurs="0" />
  <xsd:element name="AddressReferenceSystemType"
    type="addr_type:AddressReferenceSystemType_type" maxOccurs="1"
    minOccurs="0" />
  <xsd:element name="AddressReferenceSystemRules"
    type="addr_type:AddressReferenceSystemRules_type" maxOccurs="1"
    minOccurs="0" />
  <xsd:element name="AddressReferenceSystemAxis"
    type="addr_type:AddressReferenceSystemAxis_type" maxOccurs="1"
    minOccurs="0" />
  <xsd:element name="AddressReferenceSystemAxisPointOfBeginning"
    type="addr_type:AddressReferenceSystemAxisPointOfBeginning_type"
    maxOccurs="1" minOccurs="0" />
  <xsd:element name="AddressReferenceSystemReferencePolyline"
    type="addr_type:AddressReferenceSystemReferencePolyline_type"
    maxOccurs="unbounded" minOccurs="0" />
  <xsd:element name="AddressReferenceSystemRangeBreakpoint"
    type="addr_type:AddressReferenceSystemRangeBreakpoint_type"
    maxOccurs="1" minOccurs="0" />
  <xsd:element name="AddressReferenceSystemRangeBreakline"
    type="addr_type:AddressReferenceSystemRangeBreakline_type"
    maxOccurs="unbounded" minOccurs="0" />
  <xsd:element name="AddressReferenceSystemReferenceDocumentCitation"
    type="addr_type:AddressReferenceSystemReferenceDocumentCitation_type"
    maxOccurs="unbounded" minOccurs="0" />
</xsd:sequence>
</xsd:complexType>

<xsd:complexType name="RelatedAddressID_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The identifier of an
      address that is related to the
      identifier of another address.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="addr_type:AddressID_type">
      <xsd:attribute name="AddressRelationType"
        type="addr_type:AddressRelationType_type" />
    </xsd:extension>
  </xsd:simpleContent>
```

```
</xsd:complexType>

<xsd:simpleType name="AddressRelationType_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The manner in which an
      address identified by a RelatedAddressID is related to an address
      identified by an AddressID.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="RelatedTransportationFeatureId_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The unique identifier
      assigned (within the reference transportation base model) to a
      transportation feature to which an address is related. see U.S.
      Federal Geographic Data Committee, "Framework Data Content Standard
      Part 7: Transportation base."
      "Framework Data Content Standard Part
      7c: Roads."
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressTransportationFeatureId_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The unique identifier
      assigned to the particular feature that represents an address within
      a transportation base model. see U.S. Federal Geographic Data
      Committee, "Framework Data Content Standard Part 7: Transportation
      base."
      "Framework Data Content Standard Part 7c: Roads."
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressTransportationFeatureType_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The type of
      transportation feature (TranFeature) used to represent an address.
      For transportation features generally: U.S. Federal Geographic Data
      Committee, "Framework Data Content Standard Part 7: Transportation
      base."
      For roads features only: U.S. Federal Geographic Data
      Committee,
      "Framework Data Content Standard Part 7: Transportation
      base," as
      extended by "Framework Data Content Standard Part 7c:
```

```
Roads."  
</xsd:documentation>  
</xsd:annotation>  
<xsd:restriction base="xsd:string">  
  <xsd:pattern value=".*' />  
</xsd:restriction>  
</xsd:simpleType>  
  
<xsd:simpleType name="AddressTransportationSystemAuthority_type">  
  <xsd:annotation>  
    <xsd:documentation xml:lang="en">The authority that  
      maintains the transportation base model specified by the Address  
      Transportation System Name, and assigns Address Transportation  
      Feature IDs to the features it represents.  
  </xsd:documentation>  
  </xsd:annotation>  
  <xsd:restriction base="xsd:string">  
    <xsd:pattern value=".*' />  
  </xsd:restriction>  
</xsd:simpleType>  
  
<xsd:simpleType name="AddressTransportationSystemName_type">  
  <xsd:annotation>  
    <xsd:documentation xml:lang="en">The name of the  
      transportation base model to which the address is related.  
  </xsd:documentation>  
  </xsd:annotation>  
  <xsd:restriction base="xsd:string">  
    <xsd:pattern value=".*' />  
  </xsd:restriction>  
</xsd:simpleType>  
  
<xsd:simpleType name="AddressParcelIdentifier_type">  
  <xsd:annotation>  
    <xsd:documentation xml:lang="en">The primary permanent  
      identifier, as defined by the Address Parcel Identifier Source, for  
      a parcel that includes the land or feature identified by an address.  
      A parcel is "a single cadastral unit, which is the spatial  
      extent of the past, present, and future rights and interests in real  
      property."  
      Definition source for "parcel identifier":  
      Adapted from FGDC, May  
      2008. "Geographic Information Framework  
      Data Content Standard  
      Part 1: Cadastral." Section 4.2.  
      Definition source for "parcel": FGDC, May 2008.  
      "Cadastral Data  
      Content Standard for the National Spatial Data  
      Infrastructure."  
      Version 1.4 - Fourth Revision. p. 45. (Part 3.2  
      "Parcel")  
  </xsd:documentation>  
  </xsd:annotation>  
  <xsd:restriction base="xsd:string">  
    <xsd:pattern value=".*' />  
  </xsd:restriction>  
</xsd:simpleType>
```

```
<xsd:simpleType name="AddressParcelIdentifierSource_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">The permanent
      identifier for the agency, organization, or jurisdiction that
      assigns and maintains the Address Parcel Identifier.
      Definition
      source: FGDC, May 2008. "Geographic Information Framework Data
      Content Standard Part 1: Cadastral." Section 4.7.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressUUID_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The unique
      identification number assigned to an address
      by the addressing
      authority. The ID number must be
      unique for each address assigned by
      an addressing
      authority. This, combined with the FIPS number of the
      addressing authority, can provide a unique ID for every
      address in
      the US.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AssociatedAddressId_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The unique
      identification number of and address related to this one.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="MailableAddress_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Identifies whether an
      address receives USPS mail
      delivery (that is, the address is
      occupiable, and the
      USPS provides on-premises USPS mail
      delivery to
    </xsd:documentation>
  </xsd:annotation>
```

```
it).
</xsd:documentation>
</xsd:annotation>
<xsd:restriction base="xsd:string">
  <xsd:pattern value='.*' />
  <xsd:enumeration value="Yes">
    <xsd:annotation>
      <xsd:documentation>The USPS delivers mail to this address.
      </xsd:documentation>
    </xsd:annotation>
  </xsd:enumeration>
  <xsd:enumeration value="No">
    <xsd:annotation>
      <xsd:documentation>The USPS does not deliver mail to this address.
      </xsd:documentation>
    </xsd:annotation>
  </xsd:enumeration>
  <xsd:enumeration value="Unknown">
    <xsd:annotation>
      <xsd:documentation>It is unknown whether the USPS delivers mail to
      this address.</xsd:documentation>
    </xsd:annotation>
  </xsd:enumeration>
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressSideOfStreet_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The side of the
      transportation segment (right , left,
      both, none, unknown) on which
      the address is located.
      U.S. Federal Geographic Data Committee,
      "Framework Data
      Content Standard Part 7: Transportation base,"
      sections
      7.3.2 and B.3.6
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
    <xsd:enumeration value="right">
      <xsd:annotation>
        <xsd:documentation>
          The address is related to the right side of the
          street.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="left">
      <xsd:annotation>
        <xsd:documentation>
          The address is realted to the left side of the
          street.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
  </xsd:restriction>
</xsd:simpleType>
```

```
</xsd:enumeration>
<xsd:enumeration value="both">
  <xsd:annotation>
    <xsd:documentation>
      The address pertains to both sides of the
      street.
    </xsd:documentation>
  </xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="none">
  <xsd:annotation>
    <xsd:documentation>The address is not on either or both sides of
      the street or the concept of side of street does not apply to the
      address.
      For instance an intersection address would have a
      AddressSideOfStreet
      of none.
    </xsd:documentation>
  </xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="unknown"></xsd:enumeration>
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressRangeSide_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The side of the
      transportation segment (right , left,
      both, none, unknown) on which
      the address range applies.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
    <xsd:enumeration value="right">
      <xsd:annotation>
        <xsd:documentation>
          The address is related to the right side of the
          street.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="left">
      <xsd:annotation>
        <xsd:documentation>
          The address is realted to the left side of the
          street.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="both">
      <xsd:annotation>
        <xsd:documentation>
          The address pertains to both sides of the
          street.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
```

```
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="none">
  <xsd:annotation>
    <xsd:documentation>The address is not on either or both sides of
      the street or the concept of side of street does not apply to the
      address.
      For instance an intersection address would have a
      AddressSideOfStreet
      of none.
    </xsd:documentation>
  </xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="unknown"></xsd:enumeration>
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressRangeParity_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The set of Address
      Number Parity values specified in the Address Reference System
      Numbering Rules for the Address Numbers in an address range.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value=".*" />
    <xsd:enumeration value="even">
      <xsd:annotation>
        <xsd:documentation>
          All Address Numbers in the range have an Address
          Number Parity of "even".
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="odd">
      <xsd:annotation>
        <xsd:documentation>
          All Address Numbers in the range have an Address
          Number Parity of "odd".
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="both">
      <xsd:annotation>
        <xsd:documentation>
          Both even and odd Address Numbers are found in
          the range.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="none">
      <xsd:annotation>
        <xsd:documentation>
          No Address Number is found within the range.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
  </xsd:restriction>
</xsd:simpleType>
```

```
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="unknown">
  <xsd:annotation>
    <xsd:documentation>The parity of the Address Numbers in the range
      in not known. </xsd:documentation>
  </xsd:annotation>
</xsd:enumeration>
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="OfficialStatus_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Whether the address,
      street name, landmark name, or
      place name is as given by the official
      addressing
      authority (official), or an alternate or alias (official
      or unofficial), or a verified error.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.*' />
    <xsd:enumeration value="Official">
      <xsd:annotation>
        <xsd:documentation>
          The address or name as designated by the Address
          Authority.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="Alternate or Alias">
      <xsd:annotation>
        <xsd:documentation>
          An alternate or alias to the official address or
          name that is also in official or popular use.
          The Related Address
          ID can be used to link an
          alternate or alias to the Address ID of
          the
          official address. There are two types of
          alternate or alias
          names, official and
          unofficial, each of which has subtypes.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="Official Alternate or Alias">
      <xsd:annotation>
        <xsd:documentation>
          These are alternate names designated by an
          official Address Authority.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
  </xsd:restriction>
</xsd:simpleType>
```

```
<xsd:enumeration value="Official Renaming Action of the Address Authority">
    <xsd:annotation>
        <xsd:documentation>An Address Authority may replace one address or name with another, e.g. by renaming or renumbering. The prior, older address should be retained as an alias, to provide for conversion to the new address.</xsd:documentation>
    </xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Alternates Established by an Address Authority">
    <xsd:annotation>
        <xsd:documentation>An Address Authority may establish a name or number to be used in addition to the official address or name.
For example, a state highway designation (State Highway 7) may be given to a locally-named road, or a memorial name may be applied to an existing street by posting an additional sign, while the local or original name and addresses continue to be recognized as official.</xsd:documentation>
    </xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Unofficial Alternate or Alias">
    <xsd:annotation>
        <xsd:documentation>
            These are addresses or names that are used by the public or by an individual, but are not recognized as official by the Address Authority.
        </xsd:documentation>
    </xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Alternate Names Established by Colloquial Use in a Community">
    <xsd:annotation>
        <xsd:documentation>An address or name that is in popular use but is not the official name or an official alternate or alias.
    </xsd:documentation>
    </xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Unofficial Alternate Names Frequently Encountered">
    <xsd:annotation>
        <xsd:documentation>In data processing, entry errors occur. Such errors if frequently encountered may be corrected by a direct match of the error and a substitution of a correct name.
    </xsd:documentation>
    </xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Unofficial Alternate Names In Use by an Agency or Entity">
    <xsd:annotation>
        <xsd:documentation>For data processing efficiency, entities often create alternate names or abbreviations for internal use. These must be changed to the official form for public use and transmittal to external users.</xsd:documentation>
    </xsd:annotation>
</xsd:enumeration>
```

```
<xsd:enumeration value="Posted or Vanity Address">
  <xsd:annotation>
    <xsd:documentation>An address that is posted, but is not recognized
      by the Address Authority (e.g. a vanity address on a building);
    </xsd:documentation>
  </xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Verified Invalid">
  <xsd:annotation>
    <xsd:documentation>
      An address that has been verified as being
      invalid, but which keeps appearing in address
      lists. Different from
      Unofficial Alternate Names
      in that these addresses are known not to
      exist.
    </xsd:documentation>
  </xsd:annotation>
</xsd:enumeration>
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressStartDate_type">

  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The earliest date on
      which the address is known to
      exist.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:date" />
</xsd:simpleType>

<xsd:simpleType name="AddressEndDate_type">

  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The earliest date on
      which the address is known to no
      longer be valid.
    </xsd:documentation>
```

```
</xsd:annotation>

<xsd:restriction base="xsd:date" />

</xsd:simpleType>

<xsd:simpleType name="DataSetID_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The locally defined ID
      for the DataSet.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string" />
</xsd:simpleType>

<xsd:simpleType name="AddressClassification_type">

  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The type or
      classification of the address according to
      the classification
      standard.
    </xsd:documentation>
  </xsd:annotation>

  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="NumberedThoroughfareAddress"></xsd:enumeration>
    <xsd:enumeration value="IntersectionAddress"></xsd:enumeration>
    <xsd:enumeration value="TwoNumberAddressRange"></xsd:enumeration>
    <xsd:enumeration value="FourNumberAddressRange"></xsd:enumeration>
    <xsd:enumeration value="UnnumberedThoroughfareAddress"></xsd:enumeration>
    <xsd:enumeration value="LandmarkAddress"></xsd:enumeration>
    <xsd:enumeration value="CommunityAddress"></xsd:enumeration>
    <xsd:enumeration value="USPSPortalDeliveryBox"></xsd:enumeration>
    <xsd:enumeration value="USPSPortal DeliveryRoute"></xsd:enumeration>
    <xsd:enumeration value="USPSGeneral DeliveryOffice"></xsd:enumeration>
```

```
<xsd:enumeration value="GeneralAddressClass"></xsd:enumeration>

</xsd:restriction>

</xsd:simpleType>

<xsd:simpleType name="AddressFeatureType_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The type of feature
      identified by the address
      Initial list of feature types: Building
      Utility Cabinet,
      Telephone Pole, Building, Street block, street block
      face, intersection, parcel, building, entrance, unit.
      The list might
      be expanded indefinitely to include
      infrastructure and other
      features.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value='.' />
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressLifecycle_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The Lifecycle status of

```

the address.

```
</xsd:documentation>

</xsd:annotation>

<xsd:restriction base="xsd:token">

  <xsd:enumeration value='PROPOSED' />
  <xsd:enumeration value='ACTIVE' />
  <xsd:enumeration value='RETIRED' />
  <xsd:enumeration value='TEMPORARY' />

</xsd:restriction>

</xsd:simpleType>

<xsd:simpleType name="AddressLifecycleStatus_type">

  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The life cycle status
      of the address.
    </xsd:documentation>
  </xsd:annotation>

  <xsd:restriction base="xsd:token">
    <xsd:enumeration value="Potential">
      <xsd:annotation>
        <xsd:documentation>
          Address falls within a theoretical range, but
          has never been used.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
  </xsd:restriction>
</xsd:simpleType>
```

```
<xsd:enumeration value="Proposed">  
  <xsd:annotation>  
    <xsd:documentation>  
      Application pending for use of this address  
      (e.g., address tentatively issued for  
      subdivision plat that is not  
      yet fully  
      approved).  
    </xsd:documentation>  
  </xsd:annotation>  
</xsd:enumeration>  
  
<xsd:enumeration value="Active">  
  <xsd:annotation>  
    <xsd:documentation>  
      Address has been issued and is in use.  
    </xsd:documentation>  
  </xsd:annotation>  
</xsd:enumeration>  
  
<xsd:enumeration value="Retired">  
  <xsd:annotation>  
    <xsd:documentation>  
      Address was issued, but is now obsolete (e.g.  
      street name has been changed), building was  
      demolished, etc.  
    </xsd:documentation>  
  </xsd:annotation>  
</xsd:enumeration>  
  
</xsd:restriction>  
</xsd:simpleType>
```

```
<xsd:simpleType name="AddressOfficialStatus_type">

  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Whether the address is
      as given by the official
      addressing authority (official), or an
      unofficial
      variant or equivalent of it (alias).
    </xsd:documentation>
  </xsd:annotation>

  <xsd:restriction base="xsd:token">
    <xsd:enumeration value="Official">
      <xsd:annotation>
        <xsd:documentation>
          The address or name as designated by the
          addressing authority.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="Alternate Name">
      <xsd:annotation>
        <xsd:documentation>
          In any of the address classes described in 2.2,
          the collective name element may have another
          acceptable form. Some
          alternate names may be
          conditional, on attempt, ie if the alias
          resolves the address no further alternate names
          should be
          considered. Other alternate names are
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
  </xsd:restriction>
</xsd:simpleType>
```

always applied, such as official renamings. All alternate names carry a limit of applicability and a timeframe of applicability. The limit of applicability may be a limit to a single zipcode, a naming authorities boundary, such as city or county limits, or a range of address numbers with such a boundary.

</xsd:documentation>

</xsd:annotation>

</xsd:enumeration>

<xsd:enumeration value="Alternate Renamed">

<xsd:annotation>

<xsd:documentation>

Upon official renaming of an address, or renumbering of an address, or a series of addresses, the prior, older address will occur in address lists for a period of time and a conversion to current names or current addresses will need to be provided. Such an entity may match a single address or a range of addresses.

</xsd:documentation>

```
</xsd:annotation>

</xsd:enumeration>

<xsd:enumeration value="Alternate Authority Name">

  <xsd:annotation>

    <xsd:documentation>

      The alternate name is established by a separate,
      or the same, naming authority. Such names may
      apply to any address
      class, including landmarks.

      Such names would be established by
      naming
      authorities with a geographically larger area of
      responsibility, containing all or part of a
      naming authority with a
      smaller region, such as
      a state name overlaying a county name or a
      county name overlaying a city or town name.

      Examples would be a
      state highway designation
      (State Highway 7) overlaid upon locally
      named
      roads or a memorial highway overlaid on local
      road names or
      state highway names.

    </xsd:documentation>

  </xsd:annotation>

</xsd:enumeration>

<xsd:enumeration value="Alternate Colloquial Name">
```

```
<xsd:annotation>

<xsd:documentation>

    Local communities hold on to address names much
    longer than do regional agencies. A community
    may use a colloquial
    address name as much as 30
    years after that name has either expired
    or is
    no longer salient. This entry provides a
    conversion to a
    current name.

</xsd:documentation>

</xsd:annotation>

</xsd:enumeration>

<xsd:enumeration value="Unofficial Alternate Name">

    <xsd:annotation>

        <xsd:documentation>

            In data processing, entry errors occur. Such
            errors if frequently encountered may be
            corrected by a direct match
            of the error and a
            substitution to a current name.

        </xsd:documentation>

    </xsd:annotation>

</xsd:enumeration>

<xsd:enumeration value="Unofficial Agency's Name">

    <xsd:annotation>

        <xsd:documentation>

            For data processing efficiency, entities often


```

```
create alternate names for internal use. When
such alternate names
are exposed to other
entities they need to be resolved to a current
name.

</xsd:documentation>

</xsd:annotation>

</xsd:enumeration>

<xsd:enumeration value="Posted Address">
    <xsd:annotation>
        <xsd:documentation>
            Address is posted, but not recognized by
            addressing authority (e.g. vanity address on a
            building).
        </xsd:documentation>
    </xsd:annotation>
</xsd:enumeration>

<xsd:enumeration value="Verified Invalid">
    <xsd:annotation>
        <xsd:documentation>
            Address is verified as being invalid, but keeps
            appearing in address lists. Different from
            Unofficial Altername
            Names in that these are
            known not to exist;Address has been issued
            and
            is in use.
        </xsd:documentation>
    </xsd:annotation>
</xsd:enumeration>
```

```
</xsd:annotation>

</xsd:enumeration>

<xsd:pattern value=".+"></xsd:pattern>
</xsd:restriction>

</xsd:simpleType>

<xsd:simpleType name="AddressAnomalyStatus_type">

<xsd:annotation>

<xsd:documentation xml:lang="en">

A status flag, or an

explanatory note, for an address

that is not correct according to the

address schema in

which it is located, but is nonetheless a valid

address.

This field may be used to identify the type of anomaly

(e.g.

wrong parity, out of sequence, out of range, etc.)

rather than simply

whether or not it is anomalous. Local

jurisdictions may create

specific categories for

anomalies.

</xsd:documentation>

</xsd:annotation>

<xsd:restriction base="xsd:string"></xsd:restriction>

</xsd:simpleType>

<xsd:simpleType name="AddressRangeSpan_type">
<xsd:annotation>
<xsd:documentation xml:lang="en">
  Whether an address
```

```
range covers part of a transportation
segment, one segment, multiple
segments, or the entire
thoroughfare within the Address Reference
System Extent.
</xsd:documentation>
</xsd:annotation>
<xsd:restriction base="xsd:string">
  <xsd:enumeration value="Partial Segment"></xsd:enumeration>
  <xsd:enumeration value="Single Segment"></xsd:enumeration>
  <xsd:enumeration value="Multi Segment"></xsd:enumeration>
  <xsd:enumeration value="Entire Street"></xsd:enumeration>
  <xsd:enumeration value="Unknown"></xsd:enumeration>
  <xsd:pattern value=".+"></xsd:pattern>
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressRangeDirectionality_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Whether the low
      Complete Address Number of an address range is closer to the
      from-node or the to-node of the transportation segment(s) that the
      range is related to.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="With">
      <xsd:annotation>
        <xsd:documentation>The low address is nearer the from node; numbers
          ascend toward the to node.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="Against">
      <xsd:annotation>
        <xsd:documentation>The low address is nearer the to node; numbers
          descend toward the to node.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:enumeration>
    <xsd:enumeration value="With-Against">
      <xsd:annotation>
        <xsd:documentation>The numbers run in opposite directions on either
          side of the street. The low number on the left side is nearer the
          from node. The low number on the right side is nearer the to
          node.
      </xsd:documentation>
    </xsd:annotation>
  </xsd:enumeration>
  <xsd:enumeration value="Against-With">
    <xsd:annotation>
      <xsd:documentation>The numbers run in opposite directions on either
        side of the street. The low number on the left side is nearer the
        to node. The low number on the right side is nearer the from
        node.
    </xsd:annotation>
  </xsd:enumeration>
</xsd:simpleType>
```

```
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Null">
    <xsd:annotation>
        <xsd:documentation>The address range has null values for the high
            and low Complete Address Numbers.
        </xsd:documentation>
    </xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="NA">
    <xsd:annotation>
        <xsd:documentation>Does not apply (transportation segment
            directionality is inconsistent within the range).
        </xsd:documentation>
    </xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Unknown">
    <xsd:annotation>
        <xsd:documentation>The address range directionality is not known.
        </xsd:documentation>
    </xsd:annotation>
</xsd:enumeration>
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressRangeType_type">
    <xsd:annotation>
        <xsd:documentation xml:lang="en">This attribute states
            whether an address range (either a Two Number Address Range or a
            Four Number Address Range) is actual or potential.
        </xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:enumeration value="Actual">
            <xsd:annotation>
                <xsd:documentation>
                    The low and high CompleteAddressNumbers are
                    numbers that have been assigned and are in use
                    along the addressed
                    feature.
                </xsd:documentation>
            </xsd:annotation>
        </xsd:enumeration>
        <xsd:enumeration value="Potential">
            <xsd:annotation>
                <xsd:documentation>
                    The low and high CompleteAddressNumbers are
                    numbers that would be assigned if all possible
                    numbers were in use
                    along the addressed feature,
                    and there were no gaps between the
                    range and its
                    preceding and following ranges.
                </xsd:documentation>
            </xsd:annotation>
        </xsd:enumeration>
        <xsd:enumeration value="Unknown">
```

```
<xsd:annotation>
  <xsd:documentation>
    The relationship between the low and high
    CompleteAddressNumbers and the addressed feature
    is unknown.
  </xsd:documentation>
</xsd:annotation>
</xsd:enumeration>
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="LocationDescription_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A text description
      providing more detail on how to
      identify or find the addressed
      feature.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string"></xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressNumberParity_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en"> The property of an
    Address Number with respect to being odd or even.
    "A relation between
    a pair of integers: if both integers
    are odd or
    both are even they
    have the same parity; if
    one is odd and the other
    is even they have
  </xsd:documentation>
</xsd:simpleType>
```

```
different

parity."



</xsd:documentation>

</xsd:annotation>

<xsd:restriction base="xsd:token">

<xsd:enumeration value="Even" />

<xsd:enumeration value="Odd" />

</xsd:restriction>

</xsd:simpleType>

<xsd:simpleType name="AttachedElement_type">
<xsd:annotation>
<xsd:documentation xml:lang="en">
This attribute
identifies when two or more Complete
Address Number elements or two
or more Complete Street
Name elements have been combined without a
space
separating them.
</xsd:documentation>
</xsd:annotation>
<xsd:restriction base="xsd:string">
<xsd:enumeration value="Attached">
<xsd:annotation>
<xsd:documentation>
The elements inside the CompleteAddressNumber or
CompleteStreetName are attached and need special
parsing rules.
</xsd:documentation>
</xsd:annotation>
</xsd:enumeration>
<xsd:enumeration value="Not Attached"></xsd:enumeration>
<xsd:enumeration value="Unknown"></xsd:enumeration>
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressNumberSide_type">
<xsd:annotation>
<xsd:documentation xml:lang="en">
"The Concept of Left
and Right sides of a feature that a Number Range Applies to.
</xsd:documentation>
</xsd:annotation>
<xsd:restriction base="xsd:token">
<xsd:enumeration value="Left" />
<xsd:enumeration value="Right" />
<xsd:enumeration value="Unknown" />
```

```
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AddressNumberBounds_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      "The Concept of Low or
      High of numbers participating in a Number Range Applies to.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:token">
    <xsd:enumeration value="Low" />
    <xsd:enumeration value="High" />
    <xsd:enumeration value="Unknown" />
  </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="StreetNameGroup">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A geographic area where
      the street names conform to a
      theme. For example, some neighborhoods
      feature streets
      named for birds, US presidents or trees. A subset of
      the
      complete street name domain applies to this area.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="gml:MultiSurfaceType">
      <xsd:attribute name="name" type="xsd:string"></xsd:attribute>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:simpleType name="AddressSchemeName_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Name of the address
    </xsd:documentation>
  </xsd:annotation>
</xsd:simpleType>
```

scheme that operates over a specified area, i.e.: mountain addresses, plains addresses.

```
</xsd:documentation>
```

</xsd:annotation>

```
<xsd:restriction base="xsd:string">
```

```
<xsd:pattern value='.*' />
```

</xsd:restriction>

```
</xsd:simpleType>
```

<xsd:simpleType name="AddressSchemeDescription_type">

```
<xsd:annotation>
```

```
<xsd:documentation xml:lang="en">
```

A description of an Address Scheme that includes business rules about parity, naming conventions, and other matters concerning the assignment and maintenance of an addressing scheme.

This element may refer to an address ordinance, Standard Operating Procedures manual or other external document wherein the rules for addresses in a given scheme are

written.

```
</xsd:documentation>

</xsd:annotation>

<xsd:restriction base="xsd:string">

  <xsd:pattern value=".*" />

</xsd:restriction>

</xsd:simpleType>

<!-- add axes name as an attribute -->
<!-- change data type to GML::Point -->
<xsd:complexType name="AddressSchemeOrigin_type ">

  <xsd:annotation>

    <xsd:documentation xml:lang="en">

      Location where the

      address axes meet.

    </xsd:documentation>

  </xsd:annotation>

  <xsd:complexContent>

    <xsd:extension base="gml:PointType">

      <xsd:attribute name="OriginValue" type="xsd:int"></xsd:attribute>
      <xsd:attribute name="AxisId" type="xsd:string"></xsd:attribute>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="AddressSchemeAxes_type ">

  <xsd:annotation>

    <xsd:documentation xml:lang="en">

      Address axes define the

      boundaries between adjoining

      zones in address schema. Those zones may

      be quadrants

      (northwest, northeast, southeast, southwest) or other

    </xsd:documentation>
  </xsd:annotation>
</xsd:complexType>
```

```
geographic divisions. Lowest address numbers occur
nearest an axis.

</xsd:documentation>

</xsd:annotation>

<xsd:complexContent>
  <xsd:extension base="gml:MultiCurveType">
    <xsd:attribute name="AxisId" type="xsd:string"></xsd:attribute>
  </xsd:extension>
</xsd:complexContent>

</xsd:complexType>

<xsd:complexType name="AddressSchemeExtent_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Boundary of the area
      over which an address schema
      is used when assiging addresses.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="gml:MultiSurfaceType" />
  </xsd:complexContent>
</xsd:complexType>

<xsd:simpleType name="AddressDirectSource_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Source from whom the
      data provider obtained the address,
      or with whom the data provider
      validated the address.
    </xsd:documentation>
  </xsd:annotation>
</xsd:simpleType>
```

Important if the data provider did not obtain
the
address directly from the local authority.

```
</xsd:documentation>  
</xsd:annotation>  
<xsd:restriction base="xsd:string">  
  <xsd:pattern value='.*' />  
</xsd:restriction>  
</xsd:simpleType>
```

```
<xsd:simpleType name="AddressAuthority_type">
```

```
  <xsd:annotation>  
    <xsd:documentation xml:lang="en">  
      The authority (e.g.,  
      municipality, county) that created  
      or has jurisdiction over the  
      creation of an address.
```

The addressing authority may or may not be
the same as
the physical or postal jurisdiction noted for the
address.

```
</xsd:documentation>  
</xsd:annotation>  
<xsd:restriction base="xsd:string">  
  <xsd:pattern value='.*' />  
</xsd:restriction>  
</xsd:simpleType>  
<xsd:simpleType name="AddressAuthorityIdentifier_type">
```

```
<xsd:annotation>

<xsd:documentation xml:lang="en">

The FIPS or GNIS code

for the authority (e.g.,

municipality, county) that created or has

jurisdiction

over the creation of an address.
```

The addressing authority
may or may not be the same as
the physical or postal jurisdiction
noted for the
address.

```
</xsd:documentation>

</xsd:annotation>

<xsd:restriction base="xsd:string">

<xsd:pattern value='.*' />

</xsd:restriction>

</xsd:simpleType>

<!-- Complex Types -->
```

```
<xsd:simpleType name="Action_type">

<xsd:annotation>

<xsd:documentation xml:lang="en">

An action command for

incremental datasets. Add

indicates that the information is new.
```

DELETE indicates
that the information is to be removed.

```
</xsd:documentation>

</xsd:annotation>

<xsd:restriction base="xsd:token">
    <xsd:enumeration value='ADD' />
    <xsd:enumeration value='DELETE' />
</xsd:restriction>

</xsd:simpleType>

<xsd:simpleType name="DeliveryAddressType_type">
    <xsd:annotation>
        <xsd:documentation xml:lang="en">
            Whether the Delivery
            Address includes or excludes the Complete Subaddress.
        </xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:token">
        <xsd:enumeration value='SubAddress Included'>
            <xsd:annotation>
                <xsd:documentation>The Delivery Address includes the Complete
                    Subaddress (if any) </xsd:documentation>
            </xsd:annotation>
        </xsd:enumeration>
        <xsd:enumeration value='SubAddress Excluded'>
            <xsd:annotation>
                <xsd:documentation>The Delivery Address includes the Complete
                    Subaddress (if any) </xsd:documentation>
            </xsd:annotation>
        </xsd:enumeration>
        <xsd:enumeration value='Unstated'>
            <xsd:annotation>
                <xsd:documentation>Not stated/no information (default value)
                </xsd:documentation>
            </xsd:annotation>
        </xsd:enumeration>
    </xsd:restriction>
</xsd:simpleType>

<!-- Complex Elements -->

<xsd:complexType name="DeliveryAddress_type">
    <xsd:annotation>
        <xsd:documentation xml:lang="en">
            The entire address,
            unparsed, except for the Place Name, State Name,
            Zip Code, Zip Plus
        </xsd:documentation>
    </xsd:annotation>
```

```
4, Country Name, and, optionally,  
Complete Subaddress elements.  
</xsd:documentation>  
</xsd:annotation>  
<xsd:simpleContent>  
  <xsd:extension base="xsd:string">  
    <xsd:attribute name="DeliveryAddressType"  
      type="addr_type:DeliveryAddressType_type" />  
  </xsd:extension>  
</xsd:simpleContent>  
</xsd:complexType>  
  
<xsd:simpleType name="PlaceStateZip_type">  
  
  <xsd:annotation>  
    <xsd:documentation xml:lang="en">  
  
      The unparsed  
  
      accumulation of Postal City, State, and  
  
      ZIPCode elements.  
  
    </xsd:documentation>  
  </xsd:annotation>  
  
  <xsd:restriction base="xsd:string">  
  
    <xsd:pattern value=".*" />  
  
  </xsd:restriction>  
  
</xsd:simpleType>  
  
  
<xsd:complexType name="FeatureOccupancy_type">  
  <xsd:annotation>  
    <xsd:documentation xml:lang="en">  
      This element is defined  
      solely for use with the General  
      Address class, which is constructed  
      to accommodate and  
      mix addresses of all types (e.g., a general postal  
      mailing list or contact list). Place Name, State Name,  
      Zip Code, and  
      Zip Plus 4, which appear in all address  
      classes, are kept separate  
      from the rest of the address.  
      No longer a parsed datatype. Content  
      still represents it  
      as such.  
    </xsd:documentation>  
  </xsd:annotation>  
  <xsd:simpleContent>
```

```
<xsd:extension base="xsd:string"></xsd:extension>
</xsd:simpleContent>
</xsd:complexType>

<xsd:complexType name="GeneralAddress_type">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      This element is defined
      solely for use with the General
      Address class, which is constructed
      to accommodate and
      mix addresses of all types (e.g., a general postal
      mailing list or contact list). Place Name, State Name,
      Zip Code, and
      Zip Plus 4, which appear in all address
      classes, are kept separate
      from the rest of the address.
      No longer a parsed datatype. Content
      still represents it
      as such.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:string" />
  </xsd:simpleContent>
</xsd:complexType>
<!-- -->
<xsd:complexType name="LocationXY_type">
  <xsd:sequence>
    <xsd:element name="X" type="addr_type:AddressXCoordinate_type"
      minOccurs="1" maxOccurs="1" />
```

```
<xsd:element name="Y" type="addr_type:AddressYCoordinate_type"
  minOccurs="1" maxOccurs="1" />

</xsd:sequence>
</xsd:complexType>

<xsd:complexType name="LocationLongLat_type">
  <xsd:sequence>
    <xsd:element name="Longitude" type="addr_type:AddressLongitude_type"
      minOccurs="1" maxOccurs="1" />
    <xsd:element name="Latitude" type="addr_type:AddressLatitude_type"
      minOccurs="1" maxOccurs="1" />
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="Location_type">
  <xsd:sequence>
    <xsd:element name="USNGCoordinate" type="addr_type:LocationUSNG_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:element name="LongLat" type="addr_type:LocationLongLat_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:element name="XYCoordinate" type="addr_type:LocationXY_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:element name="AdressZLevel" type="addr_type:AddressZLevel_type"
      minOccurs="0" maxOccurs="1" />
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="CompleteStreetName_type">
  <xsd:sequence>
```

```
<xsd:element name="StreetNamePreModifier"
type="addr_type:StreetNamePreModifier_type"

    minOccurs="0" maxOccurs="1" />

<xsd:element name="StreetNamePreDirectional"
type="addr_type:StreetNamePreDirectional_type" minOccurs="0"
maxOccurs="1" />

<xsd:element name="StreetNamePreType"
type="addr_type:StreetNamePreType_type"

    minOccurs="0" maxOccurs="1" />

<xsd:element name="StreetName" type="addr_type:StreetName_type"
minOccurs="1" maxOccurs="1" />

<xsd:element name="StreetNamePostType"
type="addr_type:StreetNamePostType_type"

    minOccurs="0" maxOccurs="1" />

<xsd:element name="StreetNamePostDirectional"
type="addr_type:StreetNamePostDirectional_type" minOccurs="0"
maxOccurs="1" />

<xsd:element name="StreetNamePostModifier"
type="addr_type:StreetNamePostModifier_type"

    minOccurs="0" maxOccurs="1" />

</xsd:sequence>
<xsd:attribute name="AttachedElement"
type="addr_type:AttachedElement_type" />

</xsd:complexType>

<xsd:group name="CompleteStreetName_group">
<xsd:sequence>
<xsd:element name="StreetNamePreModifier"
type="addr_type:StreetNamePreModifier_type"
    minOccurs="0" maxOccurs="1" />
<xsd:element name="StreetNamePreDirectional"
type="addr_type:StreetNamePreDirectional_type" minOccurs="0"
maxOccurs="1" />
<xsd:element name="StreetNamePreType"
type="addr_type:StreetNamePreType_type"
    minOccurs="0" maxOccurs="1" />
<xsd:element name="StreetName" type="addr_type:StreetName_type"
    minOccurs="1" maxOccurs="1" />
```

```
<xsd:element name="StreetNamePostType"
type="addr_type:StreetNamePreType_type"
  minOccurs="0" maxOccurs="1" />
<xsd:element name="StreetNamePostDirectional"
type="addr_type:StreetNamePreDirectional_type" minOccurs="0"
  maxOccurs="1" />
<xsd:element name="StreetNamePostModifier"
type="addr_type:StreetNamePreModifier_type"
  minOccurs="0" maxOccurs="1" />
</xsd:sequence>
</xsd:group>

<xsd:group name="CompleteAddressNumber_group">

<xsd:annotation>
<xsd:documentation>The portion of the Complete Address Number which follows the Address Number itself. 1. The Address Number element is required to compose a Complete Address Number. The other elements are optional. 2. The Address Number must be converted from integer to characterString when constructing the Complete Address Number. 3. The great majority of Complete Address Numbers are simple integers. Infrequently the integer is followed by an alphanumeric Address Number Suffix, typically a letter or a fraction. Even more rarely the integer is preceded by an alphanumeric Address Number Prefix. In addition to the typical numbering format, four special-case formats are found in the United States: Milepost addresses, grid-style address numbers, hyphenated address numbers, and other Address Number Prefix letters or symbols. 4. Milepost Complete Address Numbers (Example: "Milepost 240"). Road mileposts are sometimes used to specify locations along highways and similar roads. Mileposts are often used to locate, for example, crash sites, emergency call boxes, bridge locations, inspection stations, roadside rest stops, railroad crossings, highway exits, park and campground entrances, RV parks, and truck stops. Milepost addresses should be parsed as follows: ---"Milepost" (or equivalent word or phrase, such as "kilometer" or 'Mile Marker") is an Address Number Prefix ---The
```

milepost number (integer part only) is an Address Number ---Tenths, if given, are an Address Number Suffix, including the decimal point.

---The road name or highway route number is a Complete Street Name, and parsed accordingly Note that, in Puerto Rico, road measurements are given in kilometers (km), which are sometimes divided into hectometers (hm). 5. Grid-style Complete Address Numbers (Example: "N89W16758"). In certain communities in and around southern Wisconsin, Complete Address Numbers include a map grid cell reference preceding the Address Number. In the examples above, "N89W16758" should be read as "North 89, West 167, Address Number 58". "W63N645" should be read as "West 63, North, Address Number 645." The north and west values specify a locally-defined map grid cell with which the address is located. Local knowledge is needed to know when the grid reference stops and the Address Number begins. 6. Hyphenated Complete Address Numbers (Example: "5-5415"). In some areas (notably certain parts of New York City, southern California, and Hawaii), Complete Address Numbers often include hyphens. Hyphenated Complete Address Numbers should not be confused with Two Number Address Ranges. The former is a single Complete Address Number while the latter includes two Complete Address Numbers. 7. Hyphenated Complete Address Numbers can be parsed so that the number indicating the site or structure is the Address Number, and the remainder (including the hyphen) is the Address Number Prefix or Address Number Suffix. 8. In New York City, hyphenated Complete Address Numbers (the recommended format for storing complete address numbers in New York City) follow a more complex set of rules. The number to the left of the hyphen indicates the "block" (conceptually--the number does not always change at street

intersections and sometimes it changes within a single block face).

The number to the right of the hyphen indicates the site or house number within the "block". If the Address Number is less than ten, it is written with a leading zero, as in 194-03 1/2 above.

Additional leading zeros may be added to either number to provide for correct sorting if the entire Complete Address Number is treated as a characterString with the hyphen included. Within the address standard, these numbers can be constructed and parsed as follows:

- a. The left-side number (194) and the hyphen form the Address Number Prefix element (text), with leading zeros shown if needed.
 - b. The right-side number (3) is the Address Number (integer), converted to a characterString with the leading zero(s) added (03) upon conversion to Complete Address Number.
 - c. The suffix, if any (such as the "1/2" in 194-03 1/2), is an Address Number Suffix.
9. Other Address Number Prefix Letters or Symbols. In Puerto Rico, Address Numbers are commonly preceded by an Address Number Prefix letter (e.g. "A 19"). In Portland, OR, negative Address Numbers have been assigned in an area along the west bank of the Willamette River. The minus sign is represented as a leading zero ("0121" and "121" are two different Complete Address Numbers). In such cases the leading zero should be treated as an Address Number Prefix.
10. Zero as a Complete Address Number. Special care should be taken with records where the Address Number is 0 (zero). Occasionally zero is issued as a valid address number (e.g. 0 Prince Street, Alexandria, VA 22314) or it can be imputed (1/2 Fifth Avenue, New York, NY 10003, for which the Address Number would be 0 and the Address Number Suffix would be "1/2"). More often, though, the Address Number is either missing or non-existent, and null value has been converted to zero.
11. Address Numbers vs. Address "Letters". In rare instances,

thoroughfare addresses may be identified by letters instead of numbers (for example, "A" Main Street, "B" Main Street, "C" Main Street, "AA" Main Street, "AB" Main Street, etc.) A few thousand such cases have been verified in Puerto Rico, and others may be found elsewhere. In such cases, the letter(s) cannot be treated as an Address Number, because an Address Number must be an integer. The letter(s) also cannot be an Address Number Prefix or Address Number Suffix, because neither of those can be created except in conjunction with an Address Number. Instead, the letter(s) should be treated a Subaddress Identifier in an Unnumbered Thoroughfare Address. (For example: Complete Street Name = "Calle Sanchez", Complete Subaddress Identifier = "AB", Complete Place Name = "Mayaguez" State Name = "PR"). As an alternative, the address may be classified in the General Address Class and treated accordingly.

</xsd:documentation>

</xsd:annotation>

<xsd:sequence>

 <xsd:element name="AddressNumberPrefix" type="addr_type:AddressNumberPrefix_type" minOccurs="0" maxOccurs="1" />

 <xsd:element name="AddressNumber" type="addr_type:AddressNumber_type" minOccurs="1" maxOccurs="1" />

 <xsd:element name="AddressNumberSuffix" type="addr_type:AddressNumberSuffix_type" minOccurs="0" maxOccurs="1" />

</xsd:sequence>

</xsd:group>

<xsd:complexType name="CompleteAddressNumber_type">

<xsd:sequence>

```
<xsd:element name="AddressNumberPrefix"
type="addr_type:AddressNumberPrefix_type"

    minOccurs="0" maxOccurs="1" />
<xsd:element name="AddressNumber" type="addr_type:AddressNumber_type"
    minOccurs="1" maxOccurs="1" />
<xsd:element name="AddressNumberSuffix"
type="addr_type:AddressNumberSuffix_type"
    minOccurs="0" maxOccurs="1" />
</xsd:sequence>
<xsd:attribute name="AddressNumberParity"
type="addr_type:AddressNumberParity_type" />
<xsd:attribute name="AttachedElement"
type="addr_type:AttachedElement_type" />
</xsd:complexType>

<xsd:complexType name="AddressNumberRange_type">

    <xsd:annotation>

        <xsd:documentation xml:lang="en">

            { Complete Address
                Number (low)* } + { Separator Element
                    * } + { Complete Address Number
                        (high)* } A set of two
                address numbers, separated by a "Separator",
                representing the low and high numbers of an address
                range. An address
                number range element should be
                accompanied by an Address Range Type
                Attribute that
                describes the type of range presented in this element.

        </xsd:documentation>
    </xsd:annotation>
    <xsd:sequence>

        <xsd:element name="CompleteAddressNumber"
type="addr_type:CompleteAddressNumber_type"

            minOccurs="2" maxOccurs="2" />
    </xsd:sequence>
```

```
<xsd:attribute name="Separator" type="addr_type:Separator_type" />
<xsd:attribute name="Parity" type="addr_type:AddressNumberParity_type" />
<xsd:attribute name="Side" type="addr_type:AddressNumberSide_type" />
</xsd:complexType>

<xsd:complexType name="PlaceName_type">
  <xsd:simpleContent>
    <xsd:extension base="xsd:string">
      <xsd:attribute name="PlaceNameType" type="addr_type:PlaceNameType_type"
/>
      <xsd:attribute name="ElementSequenceNumber"
        type="addr_type:ElementSequenceNumber_type" />
      <xsd:attribute name="GNISFeatureID" type="addr_type:GNISFeatureID_type"
/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:complexType name="CompleteSubaddress_type">
  <xsd:sequence>
    <xsd:element name="SubaddressElement"
      type="addr_type:SubaddressElement_type"
      minOccurs="1" maxOccurs="unbounded" />
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="CompleteLandmarkName_type">
  <xsd:sequence>
    <xsd:element name="LandmarkName" type="addr_type:LandmarkName_type"
      minOccurs="1" maxOccurs="unbounded" />
  </xsd:sequence>
  <xsd:attribute name="Separator" type="addr_type:Separator_type" />
</xsd:complexType>

<xsd:complexType name="CompletePlaceName_type">
  <xsd:sequence>
    <xsd:element name="PlaceName" type="addr_type:PlaceName_type"
      minOccurs="1" maxOccurs="unbounded" />
  </xsd:sequence>
  <xsd:attribute name="Separator" type="addr_type:Separator_type" />
</xsd:complexType>

<!-- Supporting Information -->
```

```
<xsd:group name="AddressAttributes_group">

  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Support information and
      record level metadata for each Address
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="AddressId" type="addr_type:AddressID_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:element name="AddressAuthority"
      type="addr_type:AddressAuthority_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:element name="RelatedAddressId"
      type="addr_type:AssociatedAddressId_type"
      minOccurs="0" maxOccurs="unbounded" />
    <xsd:element name="AddressXCoordinate"
      type="addr_type:AddressXCoordinate_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:element name="AddressYCoordinate"
      type="addr_type:AddressYCoordinate_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:element name="AddressLongitude"
      type="addr_type:AddressLongitude_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:element name="AddressLatitude" type="addr_type:AddressLatitude_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:element name="USNationalGridCoordinate"
      type="addr_type:LocationUSNG_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:element name="AddressElevation"
      type="addr_type:AddressElevation_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:element name="AddressCoordinateReferenceSystem"
      type="addr_type:AddressCoordinateReferenceSystem_type" minOccurs="0"
      maxOccurs="1" />
    <xsd:element name="AddressParcelIdentifierSource"
      type="addr_type:AddressParcelIdentifierSource_type" minOccurs="0"
      maxOccurs="unbounded" />
    <xsd:element name="AddressParcelIdentifier"
      type="addr_type:AddressParcelIdentifier_type" minOccurs="0"
      maxOccurs="unbounded" />
```

```
<xsd:element name="AddressTransportationSystemName"
  type="addr_type:AddressTransportationSystemName_type" minOccurs="0"
  maxOccurs="1" />
<xsd:element name="AddressTransportationSystemAuthority"
  type="addr_type:AddressTransportationSystemAuthority_type"
  minOccurs="0" maxOccurs="1" />
<xsd:element name="AddressTransportationFeatureType"
  type="addr_type:AddressTransportationFeatureType_type" minOccurs="0"
  maxOccurs="1" />
<xsd:element name="AddressTransportationFeatureID"
  type="addr_type:AssociatedAddressId_type"
  minOccurs="0" maxOccurs="1" />
<xsd:element name="RelatedTransportationFeatureID"
  type="addr_type:AssociatedAddressId_type"
  minOccurs="0" maxOccurs="unbounded" />

<xsd:element name="AddressRangeType"
  type="addr_type:AddressRangeType_type"
  minOccurs="0" maxOccurs="2" />
<xsd:element name="AddressRangeParity"
  type="addr_type:AddressRangeParity_type"
  minOccurs="0" maxOccurs="2" />
<xsd:element name="AddressRangeDirectionality"
  type="addr_type:AddressRangeDirectionality_type" minOccurs="0"
  maxOccurs="2" />
<xsd:element name="AddressRangeSpan"
  type="addr_type:AddressRangeSpan_type"
  minOccurs="0" maxOccurs="unbounded" />

<xsd:element name="AddressClassification"
  type="addr_type:AddressClassification_type"
  maxOccurs="1" minOccurs="0" />
<xsd:element name="AddressFeatureType"
  type="addr_type:AddressFeatureType_type"
  minOccurs="0" maxOccurs="unbounded" />
<xsd:element name="AddressLifecycleStatus"
  type="addr_type:AddressLifecycleStatus_type"
  minOccurs="0" maxOccurs="1" />
<xsd:element name="OfficialStatus" type="addr_type:OfficialStatus_type"
  minOccurs="0" maxOccurs="1" />
<xsd:element name="AddressAnomalyStatus"
  type="addr_type:AddressAnomalyStatus_type"
  minOccurs="0" maxOccurs="1" />
<xsd:element name="AddressSideOfStreet"
  type="addr_type:AddressSideOfStreet_type"
  minOccurs="0" maxOccurs="1" />
<xsd:element name="AddressZLevel" type="addr_type:AddressZLevel_type"
  minOccurs="0" maxOccurs="1" />
<xsd:element name="LocationDescription"
  type="addr_type:LocationDescription_type"
  minOccurs="0" maxOccurs="1" />
<xsd:element name="MailableAddress" type="addr_type:MailableAddress_type"
  minOccurs="0" maxOccurs="1" />
```

```
<xsd:element name="AddressStartDate"
type="addr_type:AddressStartDate_type"
minOccurs="0" maxOccurs="1" />

<xsd:element name="AddressEndDate" type="addr_type:AddressEndDate_type"
minOccurs="0" maxOccurs="1" />

<xsd:element name="DataSetID" type="addr_type:DataSetID_type"
minOccurs="0" maxOccurs="1" />

<xsd:element name="AddressReferenceSystemId"
type="addr_type:AddressReferenceSystemId_type" minOccurs="0"
maxOccurs="1" />

<xsd:element name="AddressReferenceSystemAuthority"
type="addr_type:AddressReferenceSystemAuthority_type" minOccurs="0"
maxOccurs="1" />
</xsd:sequence>

</xsd:group>

<!-- End Content Types -->

<!-- Begin Utility Groups -->

<xsd:group name="ZipCode_group">
<xsd:sequence>
<xsd:element name="ZipCode" type="addr_type:ZipCode_type"
minOccurs="1" maxOccurs="1" />
<xsd:element name="ZipPlus4" type="addr_type:ZipPlus4_type"
minOccurs="0" maxOccurs="1" />
</xsd:sequence>
</xsd:group>

<xsd:group name="PlaceStateZip_group">
<xsd:choice>
<xsd:sequence>
<xsd:element name="CompletePlaceName"
type="addr_type:CompletePlaceName_type"
minOccurs="1" maxOccurs="1" />
<xsd:element name="StateName" type="addr_type:StateName_type"
minOccurs="1" maxOccurs="1" />
<xsd:group ref="addr_type:ZipCode_group" minOccurs="0"
maxOccurs="1" />
<xsd:element name="CountryName" type="addr_type:CountryName_type"
maxOccurs="1" minOccurs="0" />
</xsd:sequence>
<xsd:element name="PlaceStateZip" type="addr_type:PlaceStateZip_type"
maxOccurs="unbounded" minOccurs="1" />
```

```
</xsd:choice>
</xsd:group>

<!-- End Utility Groups -->

</xsd:schema>

addr.xsd

<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema targetNamespace="addr"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://opengeospatial.net/gml">

  <!-- Draft Address Standard, version 0.4.2 being prepared and tested by
       a Working Group coordinated by URISA and NENA and the Census Bureau for
       submittal
       to the FGDC. -->
  <!-- During the initial draft period the rddl can be found at
      http://www.urisa.org/files/addr_std/0.4.2/addr.xsd -->

  <xsd:import namespace="addr_type" schemaLocation="addr_type.xsd">
    <xsd:annotation>
      <xsd:documentation>
        Base types form the AddressStandard
      </xsd:documentation>
    </xsd:annotation>
  </xsd:import>

  <!-- Begin Support Groups -->
  <xsd:group name="IntersectionAddress_StreetName_group">
    <xsd:sequence>
      <xsd:element name="SeparatorElement" type="addr_type:Separator_type"
        maxOccurs="1" minOccurs="1" />
      <xsd:element name="CompleteStreetName"
        type="addr_type:CompleteStreetName_type"
        maxOccurs="1" minOccurs="1" />
    </xsd:sequence>
  </xsd:group>

  <!-- Begin Base Class Types -->

  <!-- Thoroughfare Addresses -->

  <xsd:complexType name="NumberedThoroughfareAddress_type">
    <xsd:annotation>
      <xsd:documentation xml:lang="en">Defining
        Characteristics:
        1. Addresses of this class must include a Complete Address Number and
           a Complete Street Name.
        2. In addition, all thoroughfare, landmark, and postal addresses must
           include a Place Name and a State Name. A Zip Code is recommended but
           not mandatory.      </xsd:documentation>
    </xsd:annotation>
    <xsd:sequence>
```

```
<xsd:choice>
    <xsd:element name="CompleteLandmarkName"
type="addr_type:CompleteLandmarkName_type"
        minOccurs="0" maxOccurs="1" />
    <xsd:element name="CompletePlaceName"
type="addr_type:CompletePlaceName_type"
        minOccurs="0" maxOccurs="1" />
</xsd:choice>
<xsd:element name="CompleteAddressNumber"
type="addr_type:CompleteAddressNumber_type"
        minOccurs="1" maxOccurs="1" />
<xsd:element name="CompleteStreetName"
type="addr_type:CompleteStreetName_type"
        minOccurs="1" maxOccurs="1" />
<xsd:element name="CompleteSubaddress"
type="addr_type:CompleteSubaddress_type"
        minOccurs="0" maxOccurs="1" />
<xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="0"
maxOccurs="unbounded" />
<xsd:group ref="addr_type:AddressAttributes_group"
    minOccurs="0" maxOccurs="1" />
</xsd:sequence>
<xsd:attribute name="action" type="addr_type:Action_type"
    use="optional" />
</xsd:complexType>

<xsd:complexType name="IntersectionAddress_type">
<xsd:annotation>
    <xsd:documentation>Defining Characteristics:
        1. An address of this class must include two or more Complete Street
Names, each separated by a Separator Element.
        2. In addition, all thoroughfare, landmark, and postal addresses must
include a Place Name and a State Name. A Zip Code is recommended but
not mandatory.

    </xsd:documentation>
</xsd:annotation>
<xsd:sequence>
    <xsd:choice>
        <xsd:element name="CompleteLandmarkName"
type="addr_type:CompleteLandmarkName_type"
            minOccurs="0" maxOccurs="1" />
        <xsd:element name="CompletePlaceName"
type="addr_type:CompletePlaceName_type"
            minOccurs="0" maxOccurs="1" />
    </xsd:choice>
    <xsd:element name="CornerOf" type="addr_type:CornerOf_type"
        minOccurs="0" maxOccurs="1" /></xsd:element>
    <xsd:element name="CompleteStreetName"
type="addr_type:CompleteStreetName_type"
        minOccurs="1" maxOccurs="1" />
<xsd:group ref="addr:IntersectionAddress_StreetName_group"
    minOccurs="1" maxOccurs="unbounded" />
<xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"
maxOccurs="1" />
<xsd:group ref="addr_type:AddressAttributes_group"
```

```
    minOccurs="0" maxOccurs="1" />
  </xsd:sequence>
  <xsd:attribute name="action" type="addr_type:Action_type"
    use="optional" />
</xsd:complexType>

<xsd:complexType name="TwoNumberAddressRange_type">
  <xsd:annotation>
    <xsd:documentation>Defining Characteristics
      1. Addresses of this class must include two Complete Address Numbers
         separated by a hyphen. The first Complete Address Number must be
         less than or equal to the second.
      2. The two Complete Address Numbers must be followed by a Complete
         Street Name.
      3. In addition, all thoroughfare, landmark, and postal addresses must
         include a Place Name and a State Name. A Zip Code is recommended but
         not mandatory.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:choice>
      <xsd:element name="CompleteLandmarkName"
type="addr_type:CompleteLandmarkName_type"
        minOccurs="0" maxOccurs="1" />
      <xsd:element name="CompletePlaceName"
type="addr_type:CompletePlaceName_type"
        minOccurs="0" maxOccurs="1" />
    </xsd:choice>
    <xsd:element name="CompleteAddressNumber"
type="addr_type:CompleteAddressNumber_type"
        minOccurs="1" maxOccurs="1" />
    <xsd:element name="SeparatorElement" type="addr_type:Separator_type"
        maxOccurs="1" minOccurs="1" />
    <xsd:element name="CompleteAddressNumber"
type="addr_type:CompleteAddressNumber_type"
        minOccurs="1" maxOccurs="1" />
    <xsd:element name="CompleteStreetName"
type="addr_type:CompleteStreetName_type"
        minOccurs="1" maxOccurs="1" />
    <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"
        maxOccurs="unbounded" />
    <xsd:group ref="addr_type:AddressAttributes_group"
        minOccurs="0" maxOccurs="1" />
  </xsd:sequence>
  <xsd:attribute name="action" type="addr_type:Action_type"
    use="optional" />
</xsd:complexType>

<xsd:complexType name="FourNumberAddressRange_type">
  <xsd:annotation>
    <xsd:documentation>Defining Characteristics:
      1. Addresses of this class must include four Complete Address Numbers,
         representing respectively the left low, left high, right low, and
         right high four Complete Address Numbers for the block or
         transportation segment(s), followed by a Complete Street Name.
      2. In addition, all thoroughfare, landmark, and postal addresses must
         include a Place Name and a State Name. A Zip Code is recommended but
```

not mandatory.

3. The Four Number Address Range syntax follows the structure established by the U.S. Census Bureau for TIGER/Line file street segment address ranges (see <http://www.census.gov/geo/www/tiger/tgrshp2008/TGRSHP08.pdf> ("All Lines Shapefile" attribute table layout)). </xsd:documentation>

</xsd:annotation>

<xsd:sequence>

<xsd:choice>

<xsd:element name="CompleteLandmarkName" type="addr_type:CompleteLandmarkName_type" minOccurs="0" maxOccurs="1" />

<xsd:element name="CompletePlaceName" type="addr_type:CompletePlaceName_type" minOccurs="0" maxOccurs="1" />

</xsd:choice>

<xsd:element name="CompleteAddressNumber" type="addr_type:CompleteAddressNumber_type" minOccurs="1" maxOccurs="1" />

<xsd:element name="SeparatorElement" type="addr_type:Separator_type" maxOccurs="1" minOccurs="1" />

<xsd:element name="CompleteAddressNumber" type="addr_type:CompleteAddressNumber_type" minOccurs="1" maxOccurs="1" />

<xsd:element name="CompleteAddressNumber" type="addr_type:CompleteAddressNumber_type" minOccurs="1" maxOccurs="1" />

<xsd:element name="SeparatorElement" type="addr_type:Separator_type" maxOccurs="1" minOccurs="1" />

<xsd:element name="CompleteAddressNumber" type="addr_type:CompleteAddressNumber_type" minOccurs="1" maxOccurs="1" />

<xsd:element name="CompleteAddressNumber" type="addr_type:CompleteAddressNumber_type" minOccurs="1" maxOccurs="1" />

<xsd:element name="CompleteStreetName" type="addr_type:CompleteStreetName_type" minOccurs="1" maxOccurs="1" />

<xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1" maxOccurs="1" />

<xsd:group ref="addr_type:AddressAttributes_group" minOccurs="0" maxOccurs="1" />

</xsd:sequence>

<xsd:attribute name="action" type="addr_type:Action_type" use="optional" />

</xsd:complexType>

<xsd:complexType name="UnnumberedThoroughfareAddress_type">

<xsd:annotation>

<xsd:documentation xml:lang="en">Defining Characteristics:

1. Addresses of this class must contain a Complete Street Name with no Complete Address Number preceding it.
2. In addition, all thoroughfare, landmark, and postal addresses must include a Place Name and a State Name. A Zip Code is recommended but not mandatory. </xsd:documentation>

</xsd:annotation>

<xsd:sequence>

<xsd:choice>

```
<xsd:element name="CompleteLandmarkName"
type="addr_type:CompleteLandmarkName_type"
    minOccurs="0" maxOccurs="1" />
<xsd:element name="CompletePlaceName"
type="addr_type:CompletePlaceName_type"
    minOccurs="0" maxOccurs="1" />
</xsd:choice>
<xsd:element name="CompleteStreetName"
type="addr_type:CompleteStreetName_type"
    minOccurs="1" maxOccurs="1" />
<xsd:element name="CompleteSubaddress"
type="addr_type:CompleteSubaddress_type"
    minOccurs="0" maxOccurs="1" />
<xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"
    maxOccurs="1" />
<xsd:group ref="addr_type:AddressAttributes_group"
    minOccurs="0" maxOccurs="1" />
</xsd:sequence>
<xsd:attribute name="action" type="addr_type:Action_type"
    use="optional" />
</xsd:complexType>

<!-- Landmark Address Classes -->

<xsd:complexType name="LandmarkAddress_type">
<xsd:annotation>
    <xsd:documentation>Defining Characteristics:
        1. Addresses of this class must include a Complete Landmark Name, with
            no Complete Address Number preceding it and no Complete Street Name
            following it.
        2. In addition, all thoroughfare, landmark, and postal addresses must
            include a Place Name and a State Name. A Zip Code is recommended but
            not mandatory. </xsd:documentation>
    </xsd:annotation>
    <xsd:sequence>
        <xsd:element name="CompleteLandmarkName"
type="addr_type:CompleteLandmarkName_type"
            minOccurs="1" maxOccurs="1" />
        <xsd:element name="CompleteSubaddress"
type="addr_type:CompleteSubaddress_type"
            minOccurs="0" maxOccurs="1" />
        <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"
            maxOccurs="1" />
        <xsd:group ref="addr_type:AddressAttributes_group"
            minOccurs="0" maxOccurs="1" />
    </xsd:sequence>
    <xsd:attribute name="action" type="addr_type:Action_type"
        use="optional" />
</xsd:complexType>

<xsd:complexType name="CommunityAddress_type">
<xsd:annotation>
    <xsd:documentation>Defining Characteristics:
        1. Addresses of this class must include a Complete Address Number
            followed by a Complete Landmark Name or a Complete Place Name, and
            they must not include a Complete Street Name.
        2. In addition, all thoroughfare, landmark, and postal addresses must
```

```
include a Place Name and a State Name. A Zip Code is recommended but
not mandatory. </xsd:documentation>
</xsd:annotation>
<xsd:sequence>
  <xsd:element name="CompleteAddressNumber"
type="addr_type:CompleteAddressNumber_type"
    minOccurs="1" maxOccurs="1" />
  <xsd:choice>
    <xsd:element name="CompleteLandmarkName"
type="addr_type:CompleteLandmarkName_type"
      minOccurs="1" maxOccurs="1" />
    <xsd:element name="CompletePlaceName"
type="addr_type:CompletePlaceName_type"
      minOccurs="1" maxOccurs="1" />
  </xsd:choice>
  <xsd:element name="CompleteSubaddress"
type="addr_type:CompleteSubaddress_type"
    minOccurs="0" maxOccurs="1" />
  <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"
    maxOccurs="1" />
  <xsd:group ref="addr_type:AddressAttributes_group"
    minOccurs="0" maxOccurs="1" />
</xsd:sequence>
<xsd:attribute name="action" type="addr_type:Action_type"
  use="optional" />
</xsd:complexType>

<!-- Postal Delivery Address Classes -->
<xsd:complexType name="USPSPostalDeliveryBox_type">
  <xsd:annotation>
    <xsd:documentation>Defining Characteristics:
      1. Addresses of this class must include a Usps Box in the required
format, and must not include a Usps Route.
      2. In addition, all thoroughfare, landmark, and postal addresses must
include a Place Name and a State Name. A Zip Code is recommended but
not mandatory. </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="USPSBox" type="addr_type:USPSBox_type"
      minOccurs="1" maxOccurs="1" />
    <xsd:element name="CompleteSubaddress"
type="addr_type:CompleteSubaddress_type"
      minOccurs="0" maxOccurs="1" />
    <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"
      maxOccurs="1" />
    <xsd:group ref="addr_type:AddressAttributes_group"
      minOccurs="0" maxOccurs="1" />
  </xsd:sequence>
  <xsd:attribute name="action" type="addr_type:Action_type"
    use="optional" />
</xsd:complexType>

<xsd:complexType name="USPSPostalDeliveryRoute_type">
  <xsd:annotation>
    <xsd:documentation>Defining Characteristics:
      1. Addresses of this class must include a Usps Address in the
specified RR or HC or overseas military delivery format.
```

```
2. In addition, all thoroughfare, landmark, and postal addresses must
   include a Place Name and a State Name. A Zip Code is recommended but
   not mandatory. </xsd:documentation>
</xsd:annotation>
<xsd:sequence>
  <xsd:element name="USPSAddress" type="addr_type:USPSAddress_type"
    minOccurs="1" maxOccurs="1" />
  <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"
    maxOccurs="1" />

  <xsd:group ref="addr_type:AddressAttributes_group"
    minOccurs="0" maxOccurs="1" />
</xsd:sequence>
<xsd:attribute name="action" type="addr_type:Action_type"
  use="optional" />
</xsd:complexType>

<xsd:complexType name="USPSGeneralDeliveryOffice_type">
  <xsd:annotation>
    <xsd:documentation>Defining Characteristics:
      1. Addresses of this class must include a USPSGeneral Delivery Point
         in the specified format.
      2. In addition, all thoroughfare, landmark, and postal addresses must
         include a Place Name and a State Name. A Zip Code is recommended but
         not mandatory. </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="USPSGeneralDeliveryPoint"
      type="addr_type:USPSGeneralDeliveryPoint_type" />
    <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"
      maxOccurs="1" />
    <xsd:group ref="addr_type:AddressAttributes_group"
      minOccurs="0" maxOccurs="1" />
  </xsd:sequence>
  <xsd:attribute name="action" type="addr_type:Action_type"
    use="optional" />
</xsd:complexType>

<xsd:complexType name="GeneralAddressClass_type">
  <xsd:annotation>
    <xsd:documentation>Defining Characteristic:
      In addresses of this class the Delivery Address must be unparsed
      (except that in Types 2 and 3 the Complete Subaddress may be
      separated from the rest of the Delivery Address) and may contain
      thoroughfare, landmark, or postal syntaxes. This class may also
      include addresses that do not conform to any of the thoroughfare,
      landmark, or postal classes, including non-U.S. addresses.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:choice>
    <xsd:element name="GeneralAddress" type="addr_type:GeneralAddress_type"
  />
    <xsd:sequence>
      <xsd:element name="USPSGeneralDeliveryPoint"
        type="addr_type:USPSGeneralDeliveryPoint_type" />
      <xsd:group ref="addr_type:PlaceStateZip_group" minOccurs="1"
        maxOccurs="1" />
```

```
<xsd:group ref="addr_type:AddressAttributes_group"
    minOccurs="0" maxOccurs="1" />
</xsd:sequence>
</xsd:choice>
<xsd:attribute name="action" type="addr_type:Action_type" />
</xsd:complexType>

<xsd:group name="AddressCollection_group">
    <xsd:annotation>
        <xsd:documentation>
            The Single Choice Union of all Address Types
        </xsd:documentation>
    </xsd:annotation>
    <xsd:choice>
        <xsd:element name="NumberedThoroughfareAddress"
type="addr:NumberedThoroughfareAddress_type"
            minOccurs="0" maxOccurs="unbounded" />
        <xsd:element name="IntersectionAddress"
type="addr:IntersectionAddress_type"
            minOccurs="0" maxOccurs="unbounded" />
        <xsd:element name="TwoNumberAddressRange"
type="addr:TwoNumberAddressRange_type"
            minOccurs="0" maxOccurs="unbounded" />
        <xsd:element name="FourNumberAddressRange"
type="addr:FourNumberAddressRange_type"
            minOccurs="0" maxOccurs="unbounded" />
        <xsd:element name="UnnumberedThoroughfareAddress"
type="addr:UnnumberedThoroughfareAddress_type" minOccurs="0"
            maxOccurs="unbounded" />

        <xsd:element name="LandmarkAddress" type="addr:LandmarkAddress_type"
            minOccurs="0" maxOccurs="unbounded" />
        <xsd:element name="CommunityAddress" type="addr:CommunityAddress_type"
            minOccurs="0" maxOccurs="unbounded" />

        <xsd:element name="USPSPostalDeliveryBox"
type="addr:USPSPostalDeliveryBox_type"
            minOccurs="0" maxOccurs="unbounded" />
        <xsd:element name="USPSPostalDeliveryRoute"
type="addr:USPSPostalDeliveryRoute_type"
            minOccurs="0" maxOccurs="unbounded" />
        <xsd:element name="USPSGeneralDeliveryOffice"
type="addr:USPSGeneralDeliveryOffice_type"
            minOccurs="0" maxOccurs="unbounded" />

        <xsd:element name="GeneralAddressClass"
type="addr:GeneralAddressClass_type"
            minOccurs="0" maxOccurs="unbounded" />

        <xsd:element name="AddressReferenceSystem"
type="addr_type:AddressReferenceSystem_type"
            minOccurs="0" maxOccurs="unbounded" />
    </xsd:choice>
</xsd:group>

<!-- End Complex Types -->
```

```
<!-- Wrapper collecting a set of addresses -->
<xsd:element name="AddressCollection">
  <xsd:complexType mixed="false">
    <xsd:choice minOccurs="1" maxOccurs="unbounded">
      <xsd:group ref="addr:AddressCollection_group" />
    </xsd:choice>
    <xsd:attribute name="version" type="addr_type:version_type"
      use="required" />
  </xsd:complexType>
</xsd:element>
</xsd:schema>
```

UML Models

addr_type (UML)

addr (UML)

Appendix I: Address XML Examples

Address exchange packages can be simple, complex and anywhere in between. For clarity each of the Address Classes are shown here in a complete exchange package for reference and review.

Thoroughfare Address Classes

Numbered Thoroughfare Address

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr
  addr.xsd " >

  <NumberedThoroughfareAddress>
    <CompleteAddressNumber>
      <AddressNumber>123</AddressNumber>
    </CompleteAddressNumber>
    <CompleteStreetName>
      <StreetName>Main</StreetName>
      <StreetNamePostType>Street</StreetNamePostType>
    </CompleteStreetName>
    <CompletePlaceName>
      <PlaceName>Buffalo Lake</PlaceName>
    </CompletePlaceName>
    <StateName>MN</StateName>
    <ZipCode>55314</ZipCode>
  </NumberedThoroughfareAddress>
</addr:AddressCollection>
```

Intersection Address

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr
  addr.xsd " >

  <IntersectionAddress>
    <CompleteStreetName>
      <StreetName>Boardwalk</StreetName>
    </CompleteStreetName>
```

```
<SeparatorElement>and</SeparatorElement>
<CompleteStreetName>
  <StreetName>Park</StreetName>
  <StreetNamePostType>Place</StreetNamePostType>
</CompleteStreetName>
<CompletePlaceName>
  <PlaceName>Atlantic City</PlaceName>
</CompletePlaceName>
<StateName>NJ</StateName>
</IntersectionAddress>
</addr:AddressCollection>
```

Two Number Address Range

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr
  addr.xsd ">
  <TwoNumberAddressRange>
    <CompleteAddressNumber>
      <AddressNumber>401</AddressNumber>
    </CompleteAddressNumber>
    <SeparatorElement>-</SeparatorElement>
    <CompleteAddressNumber>
      <AddressNumber>418</AddressNumber>
    </CompleteAddressNumber>
    <CompleteStreetName>
      <StreetName>Green</StreetName>
      <StreetNamePostType>Street</StreetNamePostType>
    </CompleteStreetName>
    <CompletePlaceName>
      <PlaceName>Flint</PlaceName>
    </CompletePlaceName>
    <StateName>MI</StateName>
    <ZipCode>48503</ZipCode>
  </TwoNumberAddressRange>
</addr:AddressCollection>
```

Four Number Address Range

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<addr:AddressCollection version="0.4" xmlns:addr="addr"
xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
xmlns:smil20="http://www.w3.org/2001/SMIL20/"
xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xml="http://www.w3.org/XML/1998/namespace"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr
addr.xsd ">

<FourNumberAddressRange>
<CompleteAddressNumber>
<AddressNumber>1900</AddressNumber>
</CompleteAddressNumber>
<SeparatorElement>-</SeparatorElement>
<CompleteAddressNumber>
<AddressNumber>1908</AddressNumber>
</CompleteAddressNumber>
<CompleteAddressNumber>
<AddressNumber>1901</AddressNumber>
</CompleteAddressNumber>
<SeparatorElement>-</SeparatorElement>
<CompleteAddressNumber>
<AddressNumber>1909</AddressNumber>
</CompleteAddressNumber>
<CompleteStreetName>
<StreetName>Bear</StreetName>
<StreetNamePostType>court</StreetNamePostType>
</CompleteStreetName>
<CompletePlaceName>
<PlaceName>Fort Collins</PlaceName>
</CompletePlaceName>
<StateName>CO</StateName>
<ZipCode>80525</ZipCode>
</FourNumberAddressRange>
</addr:AddressCollection>
```

Unnumbered Thoroughfare Address

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4" xmlns:addr="addr"
xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
xmlns:smil20="http://www.w3.org/2001/SMIL20/"
xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xml="http://www.w3.org/XML/1998/namespace"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr
addr.xsd ">

<UnnumberedThoroughfareAddress>
```

```
<CompleteStreetName>
  <StreetName>Fagaima</StreetName>
  <StreetNamePostType>Road</StreetNamePostType>
</CompleteStreetName>
<CompletePlaceName>
  <PlaceName>Nu'uli</PlaceName>
</CompletePlaceName>
<StateName>AS</StateName>
<ZipCode>96799</ZipCode>
</UnnumberedThoroughfareAddress>
</addr:AddressCollection>
```

Landmark Address Classes

Landmark Address

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr
  addr.xsd ">
  <LandmarkAddress>
    <CompleteLandmarkName>
      <LandmarkName>Condominium Garden Hills Plaza</LandmarkName>
    </CompleteLandmarkName>
    <CompleteSubaddress>
      <SubaddressElement SubaddressComponentOrder="1">
        <SubaddressType>Torre</SubaddressType>
        <SubaddressIdentifier>2</SubaddressIdentifier>
      </SubaddressElement>
      <SubaddressElement>
        <SubaddressType>Apartamento</SubaddressType>
        <SubaddressIdentifier>905</SubaddressIdentifier>
      </SubaddressElement>
    </CompleteSubaddress>
    <CompletePlaceName>
      <PlaceName>Mayaguez</PlaceName>
    </CompletePlaceName>
    <StateName>PR</StateName>
    <ZipCode>00608</ZipCode>
    <ZipPlus4>1233</ZipPlus4>
```

```
</LandmarkAddress>  
</addr:AddressCollection>
```

Community Address

```
<?xml version="1.0" encoding="UTF-8"?>  
  
<addr:AddressCollection version="0.4" xmlns:addr="addr"  
xmlns:addr_type="addr type" xmlns:gml="http://www.opengis.net/gml"  
xmlns:smil20="http://www.w3.org/2001/SMIL20/"  
xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"  
xmlns:xlink="http://www.w3.org/1999/xlink"  
xmlns:xml="http://www.w3.org/XML/1998/namespace"  
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr  
addr.xsd ">  
  
  <CommunityAddress>  
    <CompleteAddressNumber>  
      <AddressNumberPrefix>A</AddressNumberPrefix>  
      <AddressNumber>17</AddressNumber>  
    </CompleteAddressNumber>  
    <CompleteLandmarkName>  
      <LandmarkName>Jardine Fagota</LandmarkName>  
    </CompleteLandmarkName>  
    <CompletePlaceName>  
      <PlaceName>Ponce</PlaceName>  
    </CompletePlaceName>  
    <StateName>PR</StateName>  
    <ZipCode>00731</ZipCode>  
  </CommunityAddress>  
</addr:AddressCollection>
```

Postal Delivery Address Classes

USPS Postal Delivery Box

```
<?xml version="1.0" encoding="UTF-8"?>  
  
<addr:AddressCollection version="0.4" xmlns:addr="addr"  
xmlns:addr_type="addr type" xmlns:gml="http://www.opengis.net/gml"  
xmlns:smil20="http://www.w3.org/2001/SMIL20/"  
xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"  
xmlns:xlink="http://www.w3.org/1999/xlink"  
xmlns:xml="http://www.w3.org/XML/1998/namespace"  
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr  
addr.xsd ">  
  
  <USPSPortalDeliveryBox>  
    <USPSBox>  
      <USPSBoxType>PO BOX</USPSBoxType>  
      <USPSBoxId>159753</USPSBoxId>  
    </USPSBox>  
    <CompleteSubaddress>
```

```
<SubaddressElement>
<SubaddressType>PMB</SubaddressType>
<SubaddressIdentifier>3571</SubaddressIdentifier>
</SubaddressElement>
</CompleteSubaddress>
<CompletePlaceName>
<PlaceName>Herndon</PlaceName>
</CompletePlaceName>
<StateName>VA</StateName>
<ZipCode>22071</ZipCode>
</USPSPostalDeliveryBox>
</addr:AddressCollection>
```

USPS Postal Delivery Route

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4" xmlns:addr="addr"
xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
xmlns:smil20="http://www.w3.org/2001/SMIL20/"
xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xml="http://www.w3.org/XML/1998/namespace"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr
addr.xsd ">
<USPSPostalDeliveryRoute>
<USPSAddress>
<USPSRoute>
<USPSBoxGroupType>RR</USPSBoxGroupType>
<USPSBoxGroupId>2</USPSBoxGroupId>
</USPSRoute>
<USPSBox>
<USPSBoxType>Box</USPSBoxType>
<USPSBoxId>18</USPSBoxId>
</USPSBox>
</USPSAddress>
<CompletePlaceName>
<PlaceName>Largo</PlaceName>
</CompletePlaceName>
<StateName>FL</StateName>
<ZipCode>33777</ZipCode>
</USPSPostalDeliveryRoute>
</addr:AddressCollection>
```

USPS General Delivery Office

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<addr:AddressCollection version="0.4" xmlns:addr="addr"
xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
xmlns:smil20="http://www.w3.org/2001/SMIL20/"
xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xml="http://www.w3.org/XML/1998/namespace"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr
addr.xsd ">

<USPSGeneralDeliveryOffice>
<USPSGeneralDeliveryPoint>General Delivery</USPSGeneralDeliveryPoint>
<CompletePlaceName>
<PlaceName>Tampa</PlaceName>
</CompletePlaceName>
<StateName>FL</StateName>
<ZipCode>33602</ZipCode>
<ZipPlus4>9999</ZipPlus4>
</USPSGeneralDeliveryOffice>
</addr:AddressCollection>
```

General Address Class

General Address Type 1

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4" xmlns:addr="addr"
xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
xmlns:smil20="http://www.w3.org/2001/SMIL20/"
xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xml="http://www.w3.org/XML/1998/namespace"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr
addr.xsd ">
<GeneralAddressClass>123 Main Street, Apt 1, Ames, IA
50010</GeneralAddressClass>
</addr:AddressCollection>
```

General Address Type 2

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4" xmlns:addr="addr"
xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
xmlns:smil20="http://www.w3.org/2001/SMIL20/"
xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xml="http://www.w3.org/XML/1998/namespace"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr
addr.xsd ">
<GeneralAddressClass>
<DeliveryAddress>123 Main Street, Apt 1</DeliveryAddress>
</GeneralAddressClass>
</addr:AddressCollection>
```

General Address Type 3

```
<?xml version="1.0" encoding="UTF-8"?>
<addr:AddressCollection version="0.4" xmlns:addr="addr"
  xmlns:addr_type="addr_type" xmlns:gml="http://www.opengis.net/gml"
  xmlns:smil20="http://www.w3.org/2001/SMIL20/"
  xmlns:smil20lang="http://www.w3.org/2001/SMIL20/Language"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="addr
  addr.xsd ">
  <GeneralAddressClass>
    <DeliveryAddress>123 Main Street, Apt 1</DeliveryAddress>
    <CompletePlaceName>
      <PlaceName>Ames</PlaceName>
    </CompletePlaceName>
    <StateName>IA</StateName>
    <ZipCode>50010</ZipCode>
  </GeneralAddressClass>
</addr:AddressCollection>
```

Appendix J (Informative): Compatibility of the Address Standard with the FGDC Geographic Information Framework Data Content Standard for the NDSI

1. Introduction

1.1 Purpose and Structure.

This appendix assesses the compatibility of the address standard with the FGDC's *Geographic Information Framework Data Content Standard* (hereinafter called the "framework standard"). This appendix is presented in three sections:

1. Section 1 states why and how the assessment was done, and summarizes the results.
2. Section 2 provides a brief statement of the scope of each part of the framework standard, whether the address standard is consistent with that part, and how the evaluation should be independently confirmed.
3. Section 3 shows in detail whether and to what extent the address standard meets the conformance tests set forth in Part Zero (Base Part) of the framework standard.

1.2 The Framework Standard and the Address Standard.

The framework standard "*provides interrelated thematic standards in seven data areas: cadastral, digital orthoimagery, elevation, geodetic control, governmental unit boundaries and other geographic area boundaries, hydrography, and transportation.*" The seven core themes "*are considered framework data of critical importance to the spatial data infrastructure of the Nation... The standard is divided into eight parts, one for each of the seven data themes and a base document containing information common to two or more themes.*" (Framework standard Base Part, Introduction and Sec. 1.1)

Address data are used in conjunction with several of the framework themes, most notably cadastral data and transportation data. Addresses and transportation features (especially road networks) are so closely related that their standards are interdependent. Addresses are used by the public to identify cadastral parcels and specify their locations. Street names form an integral part of thoroughfare addresses, and street segments and their network geometry form the basis for Address Reference Systems and their components. In addition, addressed features have elevations; and place names within addresses are often determined by governmental boundaries.

1.3 Assessing the Compatibility of the Address Standard with the Framework Standard.

Because address data are closely tied to several framework data themes, the address standard should be compatible with the framework standard. Compatibility assessment requires two types of tests:

1. Consistency tests, to find whether the address standard is consistent with the standards for the seven data themes, and
2. Conformity tests, to determine whether the address standard conforms to the requirements set forth in the Base Part of the framework standard, which govern the seven thematic parts of the framework standard.

1.4 Consistency Tests and Results.

The consistency tests evaluate, for each thematic part, whether the part shares any classes, elements, or defined terms with the address standard, and if so, whether the shared classes, elements, or terms are defined and used consistently. Three outcomes are possible:

- **Unrelated** - The framework part shares no classes, elements, or defined terms with the address standard.
- **Consistent** - The framework part shares classes, elements, or defined terms with the address standard; and they are defined and used consistently; and the two standards are complementary and mutually exclusive in scope.
- **Inconsistent** - The framework part shares classes, elements, or defined terms with the address standard, but they are not defined and used consistently, and/or the two standards overlap in scope.

The address standard relates to the data theme parts as follows:

- **Unrelated** - Digital Orthoimagery, Geodetic Control, and Hydrography.
- **Consistent** - Cadastral, Elevation, and Governmental Unit Boundaries and Other Geographic Area Boundaries.
- **Inconsistent** - Transportation (see 2.8.2 below).

1.5 Conformity Tests and Results

Section 3 sets forth, section by section, all the conformance requirements given in the framework standard Base Part and analyzes whether and how the address standard conforms to the requirements. The address standard satisfies all of the requirements. Section 3 below details the specific requirements and shows how the address standard conforms to them.

1.6 Relating the Address Standard to the Framework Standard Cadastral and Transportation Parts

The close relation of address data with cadastral data and with transportation data raises the question of how the address standard should be related to the cadastral and transportation parts of the framework standard. If, for example, an address record is to be related to a land parcel record, the address standard should not have to reinvent or repeat the entire cadastral part in order to make use of the data found in a cadastral dataset. This address standard incorporates a framework approach:

1. To best serve geographic data users, the address standard should provide explicitly for relationships with other standards.
2. This is best done by defining a minimum set of attributes needed to relate features across different themes (e.g. an address to a parcel, or an address to a transportation feature), that is, to provide for the foreign key needed to relate address records to cadastral features or transportation features; and
3. Those key attributes should be defined by reference to the other standard.

The Content Part of the address standard includes two elements, Address Parcel Identifier Source and Address Parcel Identifier, which were created to relate addresses with parcels.

The Content Part of the address standard includes five attributes by which an address feature can be related to a transportation event and a transportation segment or path: Address Transportation System Name, Address Transportation System Authority, Address Transportation Feature Type, Address Transportation Feature ID, and Related Transportation Feature ID. In addition, the Content Part includes five address range attributes, so that address ranges can be properly related to the transportation segments or paths they describe: Address Range Type, Address Range Parity, Address Range Side, Address Range Directionality, and Address Range Span.

1.7 Format Note

Within this appendix, quotations from the framework standard are italicized and set in quotation marks.

1.8 Sources

This appendix refers to the May 2008 versions of the *Geographic Information Framework Data Content Standard* as posted on the FDGC website at:

http://www.fgdc.gov/standards/standards_publications/. Complete citations are given in Appendix A.

2. Relationship of the Address Standard to Each of the Eight Parts of the Geographic Information Framework Data Content Standard

2.1 Part 0: Base

2.1.1 Scope of Part 0: Base.

The Base Part provides “A high-level view of the seven framework data themes[,] [a]n overall integrating Unified Modeling Language (UML) model that is supplemented by detail in the part for each data theme, [and] [t]erminology and other information common to two or more themes” (Part 0, Sec 1.2).

The Base Part defines the abstract model that underlies and unifies the seven data themes. It sets forth, for the data themes, specific conformance requirements as to definitions of terms and abbreviations, UML model notation, data dictionary content and formatting, element and attribute naming, incorporation of metadata and record identifiers, and conformance to ISO reference standards and the abstract framework data model.

2.1.2 Relation of Part 0 to Address Standard.

To be compatible with the framework standard, the address standard must meet the conformance requirements given in the Base Part, or at least not contradict them. As shown in the detailed analysis in Section 3, the address standard conforms to all of the requirements.

2.1.3. Conclusion

The address standard conforms to the Base Part.

2.2 Part 1: Cadastral

2.2.1. Scope of Part 1: Cadastral.

Part 1 “provides the information necessary to identify the existence of parcel-level cadastral information and the source of that information.” (Part 1, Sec. 1).

Part 1 is a profile of the FGDC's *Cadastral Data Content Standard (FGDC-STD-003)*. The *Cadastral Data Content Standard* "contains the standardization of the definition of entities and objects related to cadastral information including survey measurements, transactions related to interests in land, general property descriptions, and boundary and corner evidence data." (Part 1, Introduction).

2.2.2. Relation of Part 1 and the Cadastral Data Content Standard to the Address Standard.

The address standard is consistent with both the Cadastral Part of Framework Standard and the Cadastral Data Content Standard. The address standard includes two address attributes, Address Parcel Identifier and Address Parcel Identifier Source, both defined by reference to the *Cadastral Data Content Standard*. They correspond to the Parcel ID and Source Identifier (or Parcel ID Assigner) elements, respectively, in the Cadastral Part and the Cadastral Data Content Standard.

Because addresses and parcels are created and altered independently of each other, no specific address-parcel relationship can be assumed. They should be treated as independent entities, and the relationship between them should be considered, in relational database terms, as a many-to-many relationship--that is, an address can relate to any number of parcels, and a parcel can relate to any number of addresses.

The Address Parcel Identifier and the Address Parcel Identifier Source are both defined by reference to the Cadastral Standard, and they are the only parcel elements included or needed within the address standard. Except for those two attributes, the address and cadastral standards do not share any defined terms, data elements, or data classes. All other parcel elements are defined within the Cadastral Standard and need not be repeated in the address standard. All address elements and classes are defined in the address standard and need not be repeated in the Cadastral Standard. Thus the two standards are consistent in their shared elements, and mutually exclusive and complementary in their scopes.

2.2.3. Conclusion

The Address Standard is consistent with the Framework Standard Part 1: Cadastral.

2.3 Part 2: Digital Orthoimagery

2.3.1 Scope of Part 2: Digital Orthoimagery.

Part 2 "specifies data content and logical structure for the description and interchange of framework digital orthoimagery. To a certain extent, it also provides guidelines for the acquisition and processing of imagery (leading toward the generation of digital orthoimagery), and specifies the documentation of those acquisition and processing steps." (Part 2, Sec 1.1)

2.3.2 Relation of Part 2 to Address Standard.

The address standard does not refer to digital orthoimagery, and it does not share any defined terms, data elements, or data classes with Part 2.

2.3.3. Conclusion

The address standard is unrelated to the Digital Orthoimagery Part.

2.4 Part 3: Elevation

2.4.1. Scope of Part 3: Elevation.

Part 3 “*defines the geospatial data model entities and attributes that permit the exchange of digital elevation data consistent with the National Spatial Data Infrastructure’s (NSDI) framework for elevation data.*” (Part 3, Sec. 1)

2.4.2 Relation of Part 3 to Address Standard.

The address standard includes address attributes that define horizontal and vertical coordinates for address points, and the coordinate reference system to which the coordinates are referenced. The attributes are:

Horizontal: Address XCoordinate, Address YCoordinate, Address Longitude, Address Latitude, USNational Grid Coordinate

Vertical: Address Elevation

Coordinate Reference System: Address Coordinate Reference System ID, Address Coordinate Reference System Authority; Complex Element: Address Coordinate Reference System

The address attributes listed above are consistent with Part 3, and otherwise the two standards are independent and unrelated.

2.4.3 Conclusion

The address standard is consistent with the Elevation Part.

2.5. Part 4: Geodetic Control

2.5.1. Scope of Part 4: Geodetic Control.

Part 4 “*provides a common methodology for creating datasets of horizontal coordinate values and vertical coordinate values for geodetic control points represented by survey monuments, such as brass disks and rod marks. It provides a single data structure for relating coordinate values obtained by one geodetic survey method (for example, a classical line-of-sight traverse) with coordinate values obtained by another geodetic survey method (for example, a Global Positioning System geodetic control survey).*” (Part 4, Sec .1.2)

2.5.2 Relation of Part 4 to Address Standard.

The address standard does not refer to control points, and it does not share any defined terms, data elements, or data classes with Part 4.

2.5.3. Conclusion

The address standard is unrelated to the Geodetic Control Part.

2.6. Part 5: Governmental Units and Other Geographic Area Boundaries

2.6.1. Scope of Part 5: Governmental Units and Other Geographic Area Boundaries.

"The purpose of ...Part 5...is to establish the content requirements for the collection and interchange of governmental units and other geographic area boundary data and to facilitate the maintenance and use of that information." (Part 5, Sec 1).

The part recognizes four types of areas (definitions are quoted from Part 5, Sec.5.5.5):

- governmental unit - "geographic area with legally defined boundaries established under Federal, Tribal, State, or local law, and with the authority to elect or appoint officials and raise revenues through taxes" (Sec. 5.5.12)
- administrative unit - "area established by rule, treaty, or regulation of a legislative, executive, or judicial governmental authority, a non-profit organization, or private industry for the execution of some function" (Sec. 5.5.1)
- statistical unit - "geographic area defined for the collection, tabulation, and/or publication of demographic, and/or other statistical data" (sec. 5.5.20)
- other unit - "geographic area that is not a governmental unit, administrative unit, or statistical unit, as defined herein, and that is not an area defined or described in other framework parts" (Sec. 5.5.17)

2.6.2. Relation of Part 5 to Address Standard.

The address standard is related to the Governmental Units and other Geographic Area Boundaries Part in two ways:

1. Government unit names and other geographic area names often also serve as address Place Names, State Names, or Country Names.
2. Part 5 defines boundaries and spatial relationships. The Data Quality Part of the address standard uses spatial relationships to test whether the address is within the polygon that represents the address Place Name(s), State Name, or Country Name.

To provide for consistency of terminology:

1. The address standard definition of Place Name is based in part on the Framework Standard Part 5.
2. Tables 11, 13, and 15 of Part 5, which provide an extensive list of terms and definitions for various types of communities and local governments, are cited in the address standard Place Name notes.
3. Relevant terms from tables 11, 13, and 15 are listed in the address standard under Place Name as "Other Common Names for the Element."
4. The address standard notes for State Name cite the definition of "state" given in framework standard part 5, Table 13.
5. The address standard definition of Country Name incorporates the definition of "country" given in framework standard part 5, Table 13.

The data quality tests use boundary polygons and spatial relationships in a manner consistent with the definitions of Part 5.

2.6.3. Conclusion

The address standard is consistent with the Governmental Units and other Geographic Area Boundaries Part.

2.7. Part 6: Hydrography

2.7.1. Scope of Part 6: Hydrography.

"The purpose of ... Part 6 ... is to establish the content requirements for the collection and interchange of hydrography features and to facilitate the maintenance and use of that information by all users of geographic information. The Hydrography part identifies and defines terminology, encoding schema, and the data components required for describing hydrographic features, along with the metadata needed for the hydrography data exchange.... The scope of this part is limited to the information regarding surface water features and hydrographic networks for the purpose of cartography and network analysis." (Part 6, Sec. 1.1)

2.7.2. Relation of Part 6 to Address Standard.

The address standard does not refer to hydrography or hydrographic features, and it does not share any defined terms, data elements, or data classes with Part 6.

2.7.3. Conclusion

The address standard is unrelated to the Hydrography Part.

2.8 Part 7: Transportation

2.8.1 Scope of Part 7: Transportation.

Part 7 "defines the data model for describing transportation systems components of transportation systems for five [sic] modes that compose the Transportation theme of the NSDI." (Part 7, Sec. 1).

Part 7 is comprised of five sub-parts: the Transportation Base Part (Part 7), and Rail, Roads, Transit, and Inland Waterways (Parts 7b through 7e). (Part 7a, Transportation - Air, was drafted but not endorsed.) The Base, Roads, and Transit subparts are especially germane to the address standard.

2.8.2 Relation of Part 7 to Address Standard.

Addresses and transportation networks--and the standards that define them--are so closely related as to be interdependent. In particular, the thoroughfare address classes locate addresses by reference to a thoroughfare; thoroughfare networks are defined and described in the Transportation Part of the Framework Standard. Appendix C (informative) describes the interdependence and complementarity of the two standards in detail.

The address standard includes five elements by which an address feature can be related to a transportation event and a transportation segment or path: Address Transportation System Name, Address Transportation System Authority, Address Transportation Feature Type, Address Transportation Feature ID, and Related Transportation Feature ID.

The address standard includes five address range attributes, so that address ranges can be properly related to the transportation segments they describe: Address Range Type, Address Range Parity, Address Range Side, Address Range Directionality, and Address Range Span.

These elements are defined to incorporate by reference the transportation model defined in the Transportation Part, without overlapping it.

Because the Transportation Part was completed before the address standard was started, it overlaps with the address standard in certain respects. Within the Transit subpart, Annex D (Informative) describes an address extension to the transit model. The model is inconsistent with the address standard. In addition, the following classes, attributes, and code list values overlap and in some respects are inconsistent with elements in the address standard:

1. Transit, Table 1 (Data Dictionary for TransitStop) attributes: address, street side
2. Transit, Table 10(Data Dictionary for Landmark) class and attributes: Landmark, landmarkName, landmarkType, address
3. Transit, Table 11 (Data Dictionary for Facility) attributes: address
4. Roads, Table 3 (Code List for RoadLinearEventType) code list values: directionalPrefix, directionalSuffix, addressInformation, alternateNameBody, alternateNameText, alternateStreetName, alternateStreetNameBody, alternateStreetNameText, firstHouseNumber, houseNumberRange, houseNumberStructure, intermediateHouseNumber, lastHouseNumber, postalCode

2.8.3 Conclusion

The address standard and the Transportation Part are inconsistent. They can be made consistent by replacing or redefining Annex D and the class, attributes and values listed above with reference to the address standard.

3. *Conformance of the Address Standard to Framework Standard Part Zero Base Part*

The framework standard Base Part defines the abstract model that underlies and unifies the framework seven data themes. It sets forth, for the data themes, specific conformance requirements as to definitions of terms and abbreviations, UML model notation, data dictionary content and formatting, element and attribute naming, incorporation of metadata and record identifiers, and conformance to ISO reference standards and the abstract framework data model.

Section 3 sets forth the conformance requirements given in the framework standard Base Part, section by section, and analyzes whether and how the address standard conforms to the requirements. As shown below, the address standard conforms to all of the requirements.

3.1 Conformance to Base Part Section 1: Scope

Framework Base Part Section 1 states the scope of the Framework Standard, the Base Part and the seven data theme parts. It is descriptive; it imposes no conformance requirements that would apply to the address standard.

3.2 Conformance to Base Part Section 2: Conformance

Framework Base Part Section 2 states in full: “*2. Conformance. Each thematic part of the Framework Data Content Standard includes a data dictionary based on the conceptual schema presented in that part. To conform to the standard, a thematic dataset shall satisfy the requirements of the data dictionary for that theme. It shall include a value for each mandatory element, and a value for each conditional element for which the condition is true. It may contain values for any optional element. The data type of each value shall be that specified for the element in the data dictionary and the value shall lie within the domain specified for the element.*”

Address Standard Conformance to Section 2: The address standard includes a data dictionary (the Content Part) and a conceptual schema (the XSD in the Exchange Part). The Content Part provides data types and (if applicable) domains for each elements and attribute. The Classification Part shows which elements are mandatory for each class. The address standard thus includes all information needed to determine whether a given dataset conforms to the standard.

3.3 Conformance to Base Part Section 3: Normative References

Framework Base Part Section 3 refers to Annex A, which lists normative references to standards that affect two or more parts of the Framework Data Content Standard. This section imposes no conformance requirements that would apply to the address standard.

3.4 Conformance to Base Part Section 4: Maintenance Authority

Framework Base Part Section 4 states that the FGDC is the maintenance authority for the Base Part, and it provides a contact point for questions. This section imposes no conformance requirements that would apply to the address standard.

3.5 Conformance to Base Part Section 5: Terms and Definitions

Framework Base Part Section 5 defines terms used in the Base Part part or common to two or more parts of the standard. Two of the terms are pertinent to the address standard:

“*5.12 data content standard – standard that specifies what information is contained within a geospatial dataset and provides an application schema*”

Address Standard Conformance to 5.12: The address standard specifies what information is contained within an address dataset and provides an address schema. Thus the address standard fits the definition of a data content standard.

“*5.22 feature type – category of real world phenomena with common properties [ISO 19126]*”

Address Standard Conformance to 5.22: Addresses are real world phenomena with common properties. The Classification Part of the address standard specifies the common properties of the various classes of addresses. Addresses therefore meet the definition of “feature type.”

3.6 Conformance to Base Part Section 6: Symbols, Abbreviated Terms, and Notations

Framework Base Part Section 6 lists abbreviations used in the Base Part or common to two or more parts of the Framework Standard. Abbreviations used in the address standard are consistent with the abbreviations listed in the Base Part.

3.7 Conformance to Base Part Section 7: Requirements

3.7.1 Conformance to Base Part Subsection 7.1: Unified Modeling Language (UML) model

Framework Base Part Section 7.1 reads in full: “*7.1 Unified Modeling Language (UML) model. A data model expressed in UML is provided in each theme part in one of the following ways:*

- *Incorporated in the body text in each section that needs it*
- *Incorporated in the body text in a UML model-only section*
- *Incorporated in a normative annex and referenced in the body text*
- *Incorporated in the body text, but only at a high level or in a general way with detailed data components of the model presented in a normative annex*

“*The use of UML class diagrams in the Framework Data Content Standard is an application-neutral approach to depict the inherent description of and relationships among data entities. These diagrams should neither be interpreted as requiring object-oriented implementation – methods or interfaces are not typically shown on these data classes – nor should they be interpreted as representing tables in relational databases. Instead, the UML classes should be used as the basis for translation to and from internal organization data stores and applications. UML modeling environments typically support conversion of logical UML models into implementations in various programming environments through rule-based transforms.*”

Address Standard Conformance to Base Part 7.1: The Data Exchange Part provides a UML model of the standard, and a complete XSD.

3.7.2 Conformance to Base Part Subsection 7.2: Dependence on ISO 19100 series of geographic information standards

Framework Base Part Section 7.2 reads in full: “*7.2 Dependence on ISO 19100 series of geographic information standards. The Framework Data Content Standard is dependent on structures and concepts from several standards in the ISO 19100 series of geographic information standards, as shown in Figure 1. Full titles for these standards are found in Annex A. The digital orthoimagery and elevation data parts also are dependent on ISO 19123. Data standards for certain transportation modes are dependent on ISO 19133. All parts have dependencies on ISO 19107, ISO 19108, ISO 19109, ISO 19111, and ISO 19115.*”

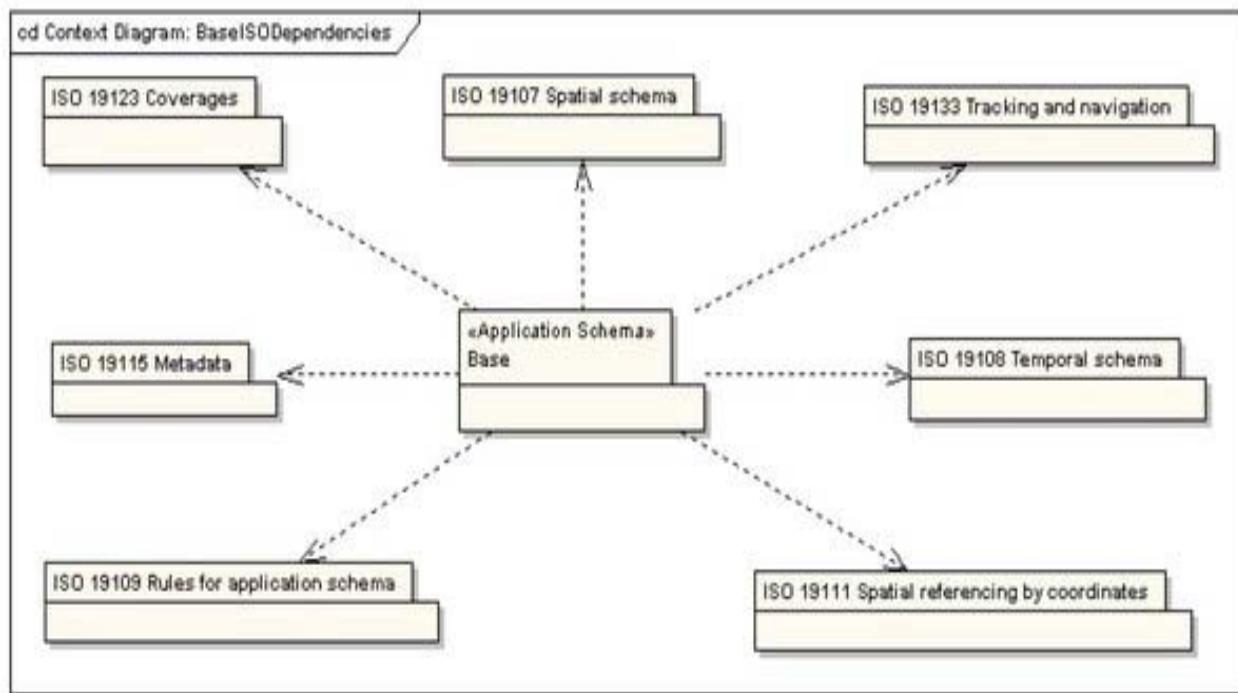


Figure 1 – Framework base dependencies on ISO series of geographic information standards

Address Standard Conformance to Base Part 7.2. The address standard is not directly dependent on any of the ISO 19100 series of geographic information standards, because there is no ISO 19100 standard for addresses. To the extent that the address standard is indirectly dependent on other ISO standards that govern the framework standard, conformance to this section (7.2) is shown by the conformance of the address standard to the Base Part of the Framework Standard.

3.7.3 Conformance to Base Part Subsection 7.3: Application schema

Framework Base Part Section 7.3 reads in full: “*7.3 Application schema. Each of the thematic Framework Data Content Standard parts includes an integrated application schema expressed in the Unified Modeling Language (UML) according to ISO 19109, Geographic information – Rules for application schema, and its normative references. The application schema specifies, as appropriate, the feature types, attribute types, attribute domain, feature relationships, spatial representation, data organization, and metadata that define the information content of a dataset.*

“*The UML models included in the parts of the standard describe the common content and structures that can be exchanged between members of the geospatial community. The use of UML and abstract modeling concepts allows the standard to be technology independent but permits current and future implementation cases to be derived from the UML model.*

“*Whenever possible, the standard references abstract UML object types from the ISO 19100 series of standards and OGC specifications. Specialization of these classes of objects allows each theme to inherit properties and behaviors and ensure their propagation when transformed into an encoding such as XML.*

“UML concepts and notation are described in Annex B. “ (Base Part subsection 7.3, quoted in full)

Address Standard Conformance to Base Part 7.3. The UML model and XSD provided in the Data Exchange Part express an integrated application schema that define the information content of the standard.

3.7.4 Conformance to Base Part Subsection 7.4: Data dictionary

3.7.4.1 Conformance to Base Part Subsection 7.4.1: General requirements

Framework Base Part Section 7.4.1 reads in full: *“7.4.1 General requirements. Each of the thematic Framework Data Content Standard parts contains, as appropriate, documentation of all features, attributes, and relationships and their definitions. A data dictionary table describes the characteristics of the UML model diagrams.*

“The data dictionary (see Table 1) is structured as follows:

- *Each UML model class equates to a data dictionary entity*
- *Each UML model class attribute equates to a data dictionary element*
- *Each UML model role name equates to a data dictionary element*
- *The shaded rows define entities*
- *The entities and elements within the data dictionary are defined by six attributes based on those specified in ISO/IEC 11179-3 for the description of data element concepts, that is, data elements without representation.”*

Table 1 – Data dictionary table format

Line	Name/Role Name	Definition	Obligation/Condition	Maximum Occurrence	Data Type	Domain
1						
2						
3						

Address Standard Conformance to Base Part 7.4.1. The address standard Content Part provides a data dictionary of all the elements and attributes specified in the address standard . The dictionary provides the required information about each element and attribute, and extends the base standard by including additional items.

In the address standard each address data element is described by giving its:

1. Element name: The name of the element.
2. Other common names for this element: Common words or phrases having the same or similar meaning as the element name.
3. Definition: The meaning of the element.

4. Definition Source: The source of the definition. ("New" indicates that the definition is original.)
5. Data Type: Whether the element is a characterString, integer, datetime, etc.
6. Existing Standards for this Element: Other standards that govern this element (if any).
7. Domain of Values for this Element: The range or set of values (if any) to which the element is restricted.
8. Source of Values: The source (if any) for the domain of values.
9. How Defined: How the domain of values is defined.
10. Example: Illustrative examples of the element.
11. Notes/Comments: Notes and comments giving further explanation about the element.
12. XML Tag: The XML tag for the element.
13. XML Model: XML model of the element.
14. XML Example: The XML model applied to a specific example of the element.
15. XML Notes: Explanatory notes about the XML model.
16. Quality Measures: Quality tests applied to the class.
17. Quality Notes: Explanatory notes about the quality measures applied to this element.

The list above includes all the information required by the Base Part 7.4.1. Specifically:

- Name/Role Name is provided under “Element Name”
- Definition is provided under “Definition”
- Obligation/Condition is provided in the XML model
- Maximum Occurrence is provided in the XML model
- Data Type is provided under “Data Type”
- Domain is provided under “Domain of Values for this Element”

The address standard data dictionary includes additional information to encourage widespread and consistent use of the standard by providing clear and complete explanatory information, notes, and examples about each element and attribute. The documentation for address data elements in the Address Standard meets the requirements used by the Framework Data Standard, and provides for additional attributes.

3.7.4.2 Conformance to Base Part Subsection 7.4.2: Name/Role name

Framework Base Part Section 7.4.2 reads in full: “7.4.2: Name/Role name. *The name/role name is a label assigned to a data dictionary entity or to a data dictionary element.*

The class name begins with an upper case letter. Spaces do not appear in an entity name: instead, multiple words are concatenated, with each word starting with a capital letter (example: XnnnYmmm). Entity names are unique within a data theme.

Element names start with a lower case letter. Spaces do not appear in an element name: instead, multiple words are concatenated, with subsequent words starting with a capital letter (example:

xnnnYmmm). Element names are unique within an entity. Combinations of the entity and element names (example: Dataset.name) are therefore unique within a data theme.

Role names are used to identify the roles of the classes at the ends of a model association and are preceded by the term “Role name” followed by a colon to distinguish them from other types of data dictionary elements.”

Address Standard Conformance to Base Part 7.4.2. The address standard conforms to this section in substance, but not in form:

1. The address standard (specifically the content and class parts) provides unique names for every element, attribute, and class.
2. Consistent naming conventions are used for for class, element, and attribute names and XML tags.
3. The address standard does not define any roles nor specify any role names.

3.7.4.3 Conformance to Base Part Subsection 7.4.3: Definition

Framework Base Part Section 7.4.3 reads in full: “*7.4.3: Definition. The definition is the entity or element description.*”

Address Standard Conformance to Base Part 7.4.3. The address standard (specifically the content and class parts) includes a formal definition for every element, attribute, and class in the standard.

3.7.4.4 Conformance to Base Part Subsection 7.4.4: Obligation/Condition

Framework Base Part Section 7.4.4 reads in full:

“7.4.4.1 General

“Used only in rows that contain elements, Obligation/Condition is a descriptor indicating whether the element shall always be populated (that is, contain a value or values) or sometimes will be populated for every instance of its owning entity. If the element is a role name, then the obligation/condition shall apply to the element indicated by the Data Type. This descriptor may have the following values: M (mandatory), C (conditional), or O (optional).

“7.4.4.2 Mandatory (M)

“Mandatory (M) indicates that the entity or element shall be populated.

“7.4.4.3 Conditional (C) “Conditional (C) specifies an electronically manageable condition under which at least one entity or element is mandatory. “Conditional” is used for one of the three following possibilities:

- *Expressing a choice between two or more options. At least one option is mandatory and must be populated*
- *Populating an entity or element if another element has been populated*
- *Populating an element if a specific value for another element has been populated.*

“To facilitate reading by humans, the specific value is used in plain text (for example, “C/not defined by encoding?”). However, the code shall be used to verify the condition in electronic user interface,

“If the answer to the condition is positive, then the entity or the element shall be populated.

“7.4.4.4 Optional (O)“

“The entity or the element may be populated. Optional (O) entities and optional elements have been defined to provide a guide to those looking to fully document their data. (Use of this common set of defined elements will help promote interoperability among framework data users and producers.) Optional entities may have mandatory elements. If the optional entity is used, the mandatory elements shall be used. If an optional entity is not used, the elements contained within that entity (including mandatory elements) will also not be used. “

Address Standard Conformance to Base Part 7.4.4. Obligation/conditionality is indicated in the XML model of each element and attribute, and in syntax descriptions and XML model of each address class.

3.7.4.5 Conformance to Base Part Subsection 7.4.5: Maximum occurrence

Framework Base Part Section 7.4.5 reads in full: *“7.4.5: Maximum occurrence Used only in rows that contain elements, maximum occurrence specifies the maximum number of instances the element may have. Single occurrences are shown by “1”; unconstrained number of instances are represented by an asterisk “*”. Fixed number occurrences, other than one, are allowed and will be represented by the corresponding number (that is, “2”, “3” ...and so on). If the element is a role name, then the maximum occurrence shall apply to the element indicated by the Data Type.”*

Address Standard Conformance to Base Part 7.4.5. The XML model for each class and complex element shows the maximum occurrence for each of the elements and attributes that may comprise it.

3.7.4.6 Conformance to Base Part Subsection 7.4.6: Data type

Framework Base Part Section 7.4.6 reads in full: *“7.4.6: Data type. Specifies a set of distinct values for representing the elements (example: integer, real, CharacterString, DateTime, and Boolean). The data type attribute is also used to define stereotypes for entities and entity names for elements which are role names. These data types are generic types that do not infer an implementation. “* (Base Part 7.4.6, quoted in full)

Address Standard Conformance to Base Part 7.4.6. The data type for each element and attribute is specified in its description in the Content Part. Data types are named and defined in accordance with the Code List for Data Type (see Base Part section 7.8.2.2, Table 4), except for certain address reference system elements, which are geometric. All geometric data types are defined in the Open Geospatial Consortium's "OpenGIS(R) Geography Markup Language (GML)" version 3.1.1 (see Appendix A for a complete citation):

3.7.4.7 Conformance to Subsection Base Part 7.4.7: Domain

Framework Base Part Section 7.4.7 reads in full: *“7.4.7: Domain. For an entity, the domain indicates line numbers covered by the elements of that entity in the table.*

“For an element, the domain specifies the values allowed. “Unrestricted” indicates that no restrictions are placed on the data type of the element. Code lists provide a list of potential values, although additional values can be used. Enumerations provide a non-extensible list of potential values. “ (Base Part 7.4.7, quoted in full)

Address Standard Conformance to Base Part 7.4.7. Domain information for each element and attribute is provided in its description in the Content Part. For address classes, no domain information is provided, because no address class has any domains.

3.7.5 Conformance to Subsection Base Part 7.5: Metadata

Framework Base Part Section 7.5 reads in full:

“7.5.1 Requirement for metadata”

“All datasets shall have metadata that conforms to at least the minimal set of mandatory elements of either ISO 19115, Geographic Information – Metadata, or FGDC-STD-001-1998, Content Standard for Digital Geospatial Metadata (revised June 1988). However, more extensive metadata should be provided.”

“7.5.2 Associating metadata entry with data transfer”

“The mechanism used to associate a structured metadata entry with a data transfer is not explicitly declared in the Framework Data Content Standard due to possible complex dependencies on either the structure of FGDC or ISO metadata being used. It is the intention of the standard to logically insert the appropriately structured metadata from either standard wherever the class attribute “metadata” occurs. The implementation of this capability may be specified in the implementation annexes as referenced to external metadata schemas in the appropriate implementation or programming environment.”

Address Standard Conformance to Base Part 7.5. The address standard incorporates by reference, for address data files, the FGDC's *Content Standard for Digital Geospatial Metadata* (CSDGM)(FGDC 1998). The address standard extends the CSDGM by providing attributes for record-level address metadata.

3.7.6 Conformance to Subsection Base Part 7.6: Model integration

Framework Base Part Section 7.6 reads in full: *“7.6: Model integration. The dependencies among the models specified in the thematic parts of the standard are shown in Figure 2. In Figure 2, the parenthetical text (from Transportation) means that there is a UML package called “Transportation” in which all transportation constructs reside, including Transportation Base.”*

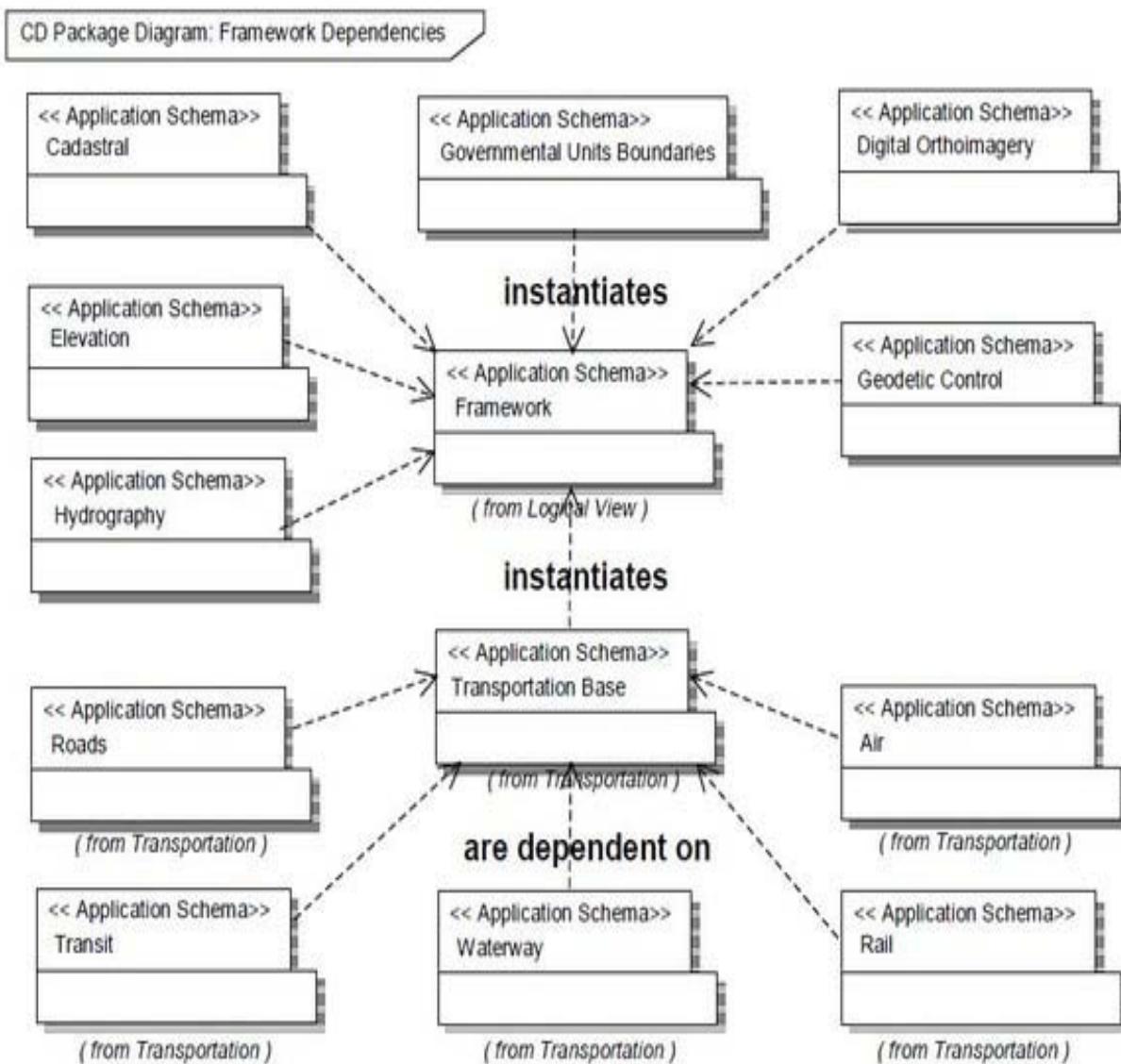


Figure 2 – Dependencies among the models specified in the thematic parts

Address Standard Conformance to Base Part 7.6. If the address standard were to be incorporated into the Framework Data Standard, it would be instantiated by and dependent on the Base Part. The address standard is also related directly to the Cadastral and Transportation themes, as described in Sections 2.2 and 2.8 this Appendix.

3.7.7 Conformance to Subsection Base Part 7.7: Establishment of identifiers

Framework Base Part Section 7.7 reads in full (omitting the footnote): “*7.7: Establishment of identifiers. Every UML class that represents a feature type includes attributes for identifier and an optional identifier authority. This construct can be used to distinguish between similar values in different datasets. Policies may be developed within a community for assigning namespaces and permanent identifiers to features and expressing equivalencies among features that have*

been assigned different namespaces and, therefore, different identifiers, which may be permanent. If there is no standard way to create and manage identifiers, users may develop their own schema and include its description in the dataset metadata.”

Address Standard Conformance to Base Part 7.7. The address standard defines an address attributes, Address ID, to serve as an address identifier, and another attribute, Address Authority, to serve as an authority identifier. Address ID may be implemented as a local ID or as a UUID.

3.7.8 Conformance to Base Part Subsection 7.8: Framework feature model and common classes

3.7.8.1 Conformance to Subsection Base Part 7.8.1: Introduction

Framework Base Part Section 7.8.1 reads in full: “*7.8.1: Introduction. The Framework Data Content Standard organizes information using the ISO General Feature Model [ISO 19109]. Features are abstractions of real-world phenomena or man-made constructs that typically have a persistent or assigned identity, such as a name or code, a location represented by a formalized geometry, and a set of other properties and relationships.*

“Each framework theme, represented by a part in the standard, documents one or more formal feature types using a logical information model (attributes, associations, conditionality) represented as class diagrams in UML. All feature types (see darker shaded classes in Figure 3) are denoted in UML using the stereotype <>. All features in every part of the standard are subclasses of this common framework Feature and thus inherit its properties as shown in the diagram. Except for identifier, all properties are optional and most of them are repeatable.

“All classes stereotyped as <> implement the Abstract class named "Feature" in the Base and inherit all of its properties. Likewise, any class stereotyped as <> implements the Abstract class of the same name in the Base and inherits its property of "metadata". Inheritance is also shown through an italicized parent classname in the upper right corner of the child class.

“The Framework Data Content Standard supports the transfer of geographic data from one party to another. A group of features, known as a feature collection, would define a transfer. Metadata may be associated with the contents of the transfer, as is done now with FGDC “dataset-level” metadata. This feature collection may include features from one or more thematic parts of the standard, depending on the application and its requirements.

“Table 2 represents the information from Figure 3 in data dictionary format.

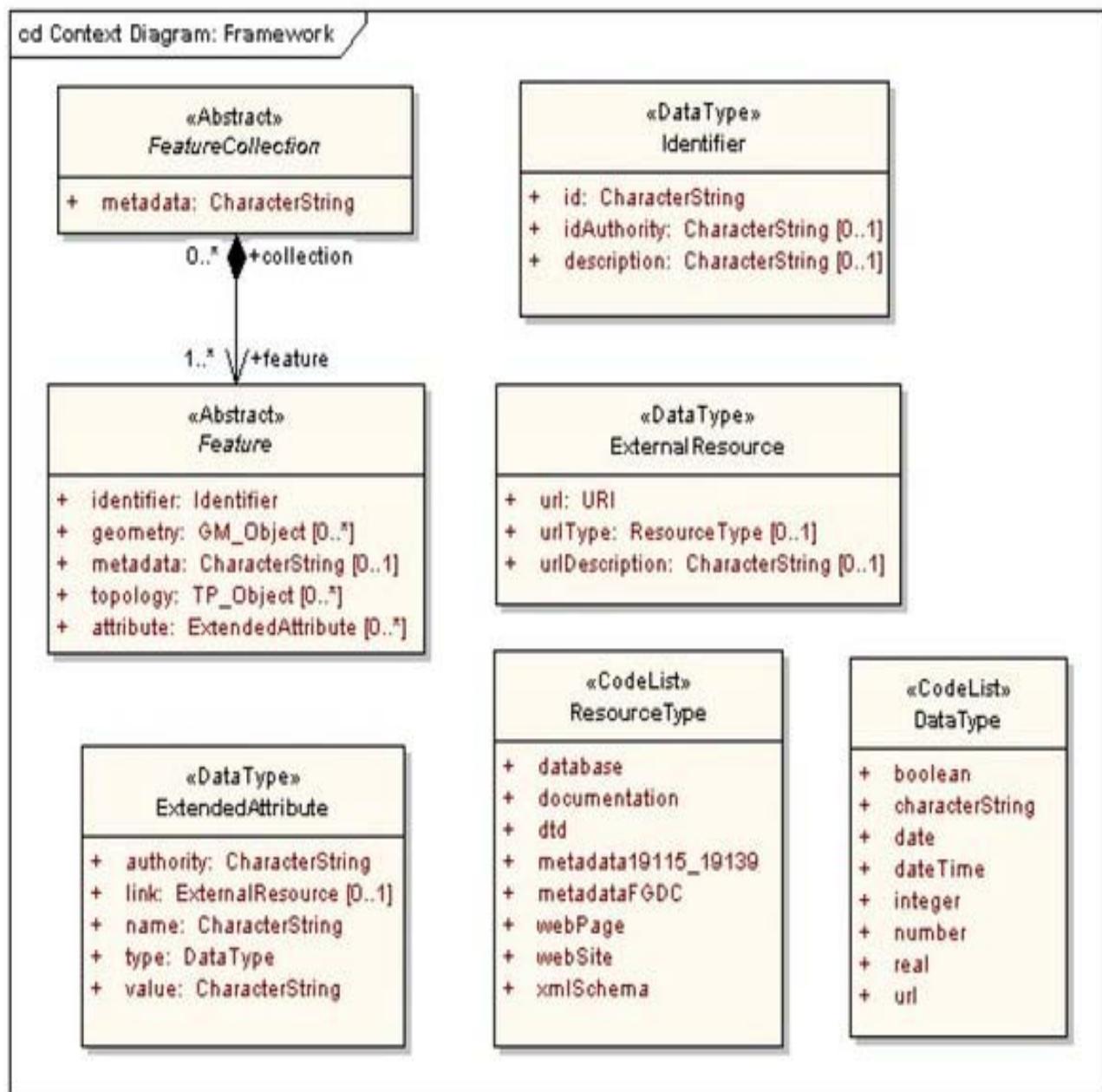


Figure 3 – The conceptual framework feature model and common classes

Table 2 – Description of common UML classes

Line	Name/Role Name	Definition	Obligation/ Condition	Maximum Occurrence	Data Type	Domain
1	FeatureCollection	Aggregation of all features being transferred			<<Abstract>>	Lines 2-3
2	metadata	Structured or unstructured metadata as defined by the community of practice	M	1	CharacterString	May be text or structured metadata fragment or URI
3	Role name: feature	Features in the feature collection	M	*	<<Abstract>> Feature	Unrestricted
4	Feature	Abstraction of a real world phenomenon			<<Abstract>>	Lines 5-10
5	Identifier	Label that uniquely identifies a feature, unique within the transfer	M	1	<<DataType>> Identifier	Unrestricted
6	geometry	Geometric representation of the feature	0	*	<<Type>> GM_Object	Defined in ISO 19107
7	metadata	Structured or unstructured metadata as defined by the community of practice	0	1	CharacterString	May be text or structured metadata fragment or URI
8	topology	Connectivity between one feature and another	0	*	<<Type>> TP_Object	Defined in ISO 19107
9	attribute	Producer-defined attribute for inclusion in transfer	0	*	<<DataType>> ExtendedAttribute	Unrestricted
10	Role name: collection	Collection of which this feature is a part	0	*	<<Abstract>> FeatureCollection	Unrestricted
11	Identifier	Construct to group an identifier with an authority and a description			<<DataType>>	Lines 12-14
12	id	Identification value (ID)	M	1	CharacterString	Unrestricted
13	idAuthority	Name of the issuing authority for the identifier	0	1	CharacterString	Unrestricted

Line	Name/Role Name	Definition	Obligation/Condition	Maximum Occurrence	Data Type	Domain
14	description	Description or qualification of the identification value within the namespace of the authority	0	1	CharacterString	Unrestricted
15	ExtendedAttribute	Property that permits the identification and transport of an unofficial feature attribute			<<DataType>>	Lines 16-20
16	authority	Name of the organization responsible for the naming of this attribute	M	1	CharacterString	Unrestricted
17	link	Identification of an external resource that provides documentation of this attribute	0	1	<<DataType>> ExternalResource	Unrestricted
18	name	Name of the attribute being transferred	M	1	CharacterString	Unrestricted
19	type	Data type of the attribute being transferred	M	1	<<CodeList>> DataType	Unrestricted
20	value	Value of the attribute being transferred	M	1	CharacterString	Constrained by the valid companion data type
21	ExternalResource	Qualified link to a network accessible object			<<DataType>>	Lines 22-24
22	url	Network accessible resource in the form of a Uniform Resource Locator (URL) or valid Uniform Resource Identifier (URI)	M	1	URI	Unrestricted
23	urlType	Classification of the information content referenced by the URL	0	1	<<CodeList>> ResourceType	Unrestricted
24	urlDescription	Additional characteristics of the URL for advice or display	0	1	CharacterString	Unrestricted

“The extensibility mechanism shown in Figure 3 (ExtendedAttribute) allows for the description and transfer of additional ad hoc data content without requiring changes or extensions to the data schema. This repeatable structure may carry one or more additional attributes and their values for use in peer-to-peer transfer of unofficial feature properties. Any feature class may incorporate this reference to the ExtendedAttribute class. The link property of ExtendedAttribute expands to a triplet of elements associated with a Uniform Resource Locator (URL) for external documentation. Some ResourceType s are shown as a code list to characterize the information content found at the referenced URL. For Transportation parts of this standard, events provide an alternative method of extending attributes when their values are not necessarily constant for the entire length of a feature.”

Address Standard Conformance to Base Part 7.8.1. The address standard meets this requirement. Addresses meet the definition of “feature.” The Classification Part defines an abstract Address class and defines subclasses of the feature “addresses”, using a logical

information model. The model is presented as both a UML model and an XSD. The standard supports both record-level and file-level metadata, and the Exchange Part provides a template for both monolithic and transactional exchanges. The data model is extensible.

3.7.8.2 Conformance to Base Part Subsection 7.8.2: Code lists

Framework Base Part Section 7.8.2 reads in full:

“7.8.2.1 ResourceType code list

“ ResourceType is a CodeList of values for the attribute urlType.

“Table 3 – CodeList for ResourceType

Name	Definition
database	Collection of records where each record has the same structure of data elements
documentation	Resource file that describes usage of referenced URL
dtd	Schema expressed via a set of declarations written in Document Type Definition (DTD) language*
metadata_19115_19139	Metadata records formatted using structure from ISO 19115, Geographic information – Metadata, and ISO 19139, Geographic information – Metadata - XML schema implementation
metadataFGDC	Metadata records formatted using structure from a version of the FGDC Content Standard for Digital Geospatial Metadata
webPage	Resource on the World Wide Web usually in Hypertext Markup Language (HTML) format
webSite	Collection of Web pages that common to a particular domain name or subdomain on the World Wide Web
xmlSchema	Schema expressed using a version of the XML Schema World Wide Web Consortium (W3 C) Recommendation

“7.8.2.2 DataType code list

“ DataType is a CodeList of values for the attribute dataType.

“Table 4 – CodeList for DataType

Name	Definition
boolean	True or False
characterString	A CharacterString is an arbitrary-length sequence of characters including accents and special characters from repertoire of one of the adopted character sets
date	Values for year, month, and day
dateTime	A combination of year, month, and day and hour, minute, and second
integer	Any member of the set of positive whole numbers, negative whole numbers and zero
number	One of a series of symbols of unique meaning in a fixed order which may be derived by counting
real	Real numbers are all numbers that can be written as a possibly never repeating decimal fraction
url	Network accessible resource in the form of a Uniform Resource Identifier (URI)

Address Standard Conformance to Base Part 7.8.2. All data types in the data dictionary conform to the code list in Table 4, except for certain address reference system elements, which are geometric features. The address standard includes no resource types, so Table 3 does not apply to the address standard.

3.8 Conformance to Base Part Section 8: Encoding of framework data content

Framework Base Part Section 8 reads in full: “*8: Encoding of framework data content. To support data exchange, the parts of the Framework Data Content Standard may include informative annexes that provide guidance to implementers on the transformation of the UML information content into a specific encoding environment. These annexes not only document the context and environment of implementation and validation schema for the information content unique to a part of the standard, but also may include encoding or schema representation of heterogeneous collections of features from multiple themes. Because the standard includes a single UML model of all themes that are exposed progressively through a series of limited diagrams in the context of a theme, it represents an integrated set of classes for all framework data.*”

Address Standard Conformance to Base Part 8. The address standard provides both a UML model and an XSD. The XSD provides guidance on the transformation of address information into a specific encoding environment. The Content and Classification parts of the address standard provide XML models for each class, element, and attribute defined in the standard. The Exchange part of the standard integrates the XML element, attribute, and class models into a single XSD. The XSD provides complete, open, standard XML data exchange templates for both monolithic and transactional data exchanges. For validation tests, similar guidance is provided by inclusion of complete SQL pseudocode in each test defined in the Data Quality Part of the address standard.