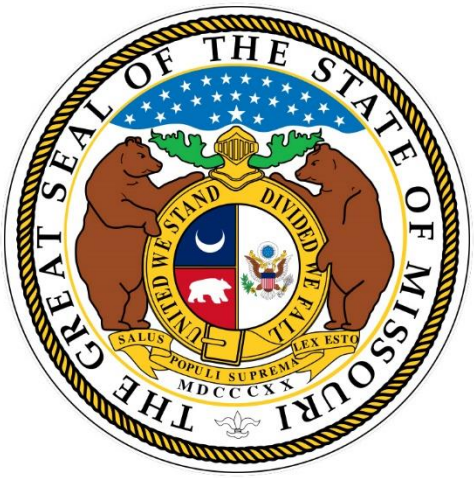

Missouri NG9-1-1 GIS Data Standard & Best Practices

February 2021

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1 Introduction

In 2020, the State of Missouri 9-1-1 Board, in collaboration with the NG9-1-1 GIS Subcommittee, conducted efforts to prepare the State of Missouri for the implementation of Next Generation 9-1-1 (NG9-1-1). This standard and best practices document is the result of one such effort that focused on GIS data preparation for NG9-1-1.

1.1 Background

Accurate and complete GIS data is critical to the operation of an NG9-1-1 system. Locally developed GIS data will be used for routing and transferring 9-1-1 calls to the appropriate Public Safety Answering Point (PSAP) and to support the dispatch of emergency services providers. This requires the GIS data to be standardized for use in NG9-1-1. Most authoritative GIS data in Missouri is created at the county or local level to meet local government needs, including 9-1-1 purposes. Some data layers exist at the state level, such as hydrology, aerial imagery, state parks and trails, that may or may not be necessary for public safety.

1.2 Purpose of the Missouri NG9-1-1 GIS Data Standard

The purpose of the Missouri NG9-1-1 GIS Data Standard is to establish a uniform, common data model for the required NG9-1-1 GIS layers in the State of Missouri. The National Emergency Number Association (NENA) sets standards for implementing and managing 9-1-1 systems, including the data used in public safety systems to support emergency response, particularly as it relates to NG9-1-1. This document also provides recommendations and best practices for creating and maintaining the Road Centerline, Site/Structure Address Point and Boundary GIS data layers to meet Missouri's NG9-1-1 GIS data requirements and quality control processes for all of the required NG9-1-1 GIS data layers.

1.3 Applicability

This standard is not intended to replace any data producer's local schema, internal data capture, or storage specifications. Rather, it is the required GIS data standard for use in NG9-1-1 functional elements and core services such as:

- **Location Validation Function (LVF)** to determine if a civic location is valid for call routing and dispatch before a 911 call is ever made,
- **Emergency Call Routing Function (ECRF)** to identify the location of a 911 call and then perform a geographic query to determine the appropriate PSAP to route the call to,
- **MSAG Conversion Service (MCS)** to create an MSAG (Master Street Address Guide) record from an NG9-1-1 PIDF-LO record for backwards compatibility or to create a PIDF-LO (Presence Information Data Format – Location Object) record from an MSAG record for use in NG9-1-1,
- **Geocode Service (GCS)** to provide geocoding and reverse-geocoding services,
- **Mapping Data Service (MDS)** to display a map to the telecommunicator showing the location of an out-of-area call. GIS data to be used in NG9-1-1 must be in the format defined in this standard. Some data producers may find benefits from storing their data in this structure, such as reducing incompatibilities and inconsistencies when sharing data or eliminating the need for ETL (Extract, Transform, Load) processes when providing data for NG9-1-1 purposes.

1.4 Sources of this Standard

The Missouri NG9-1-1 GIS Data Standard is built upon the NENA Standard for NG9-1-1 GIS Data Model (NENA-STA-006.1.1) [1] and includes all required GIS data layers and their elements.

2 Compliance Notes

The NENA Standard for NG9-1-1 GIS Data Model [1] identifies the GIS data layers necessary for NG9-1-1 and defines their required data schema and associated fields. This Missouri NG9-1-1 GIS Data Standard is fully compliant with the NENA Standard. All fields listed in the NENA standard for these layers are included in this

document as well as a few additional fields specific to the State of Missouri's needs. All fields listed in this standard must be included in the GIS data layers, even if data does not exist for a field or a field is classified as Optional.

2.1 Required Layers

The required layers for Missouri NG9-1-1 GIS Data Standard follows the NENA standard with the additional of the strongly recommended layers of Incorporated Municipality Boundary and County Boundary. These layers must be available for the NG9-1-1 system and public safety systems to support emergency response. The required layers for this standard are:

- Road Centerlines
- Site/Structure Address Points
- PSAP Boundaries
- Emergency Service Boundaries (law enforcement, fire/rescue, emergency medical services)
- Provisioning Boundaries
- Incorporated Municipality Boundaries
- County Boundaries

2.2 Spatial Reference

Local GIS data may be maintained in any datum and coordinate system desired, however, GIS data must be transformed into the World Geodetic System of 1984 (WGS 1984) prior to its use in NG9-1-1 systems. All GIS data in i3 must be in this WGS84 format to support interoperability between all systems and all sites across the US, as referenced in NENA STA 010.

- Geodetic parameters for WGS84 are specified by the European Petroleum Survey Group (EPSG) as follows:
    - For 2-dimensional geometries the geodetic parameters are required to follow EPSG::4326
    - For 3-dimensional geometries the geodetic parameters are required to follow EPSG::4979

2.3 Title Case

The standard requires that field values use title case format with the exception of the Country and State fields, which must be uppercase. Legacy Street Name fields should preserve the case of existing data. It is understood that some end users may need the uppercase format for some applications. There are several methods that allow end users to convert the data to uppercase for a desired purpose. Having the data in a title case format makes it much easier to automatically convert the data if needed.

2.4 Abbreviations

NENA NG9-1-1 standards require certain field values to be fully spelled out to remove confusion and ambiguity, in compliance with Civic Location and Data Exchange Format (CLDXF) standards. This is important when dealing with street names where abbreviations could have multiple interpretations (e.g., "W Charles Tr" could be West Charles Trail, West Charles Trace, William Charles Trail, William Charles Trace, etc.). It is understood that abbreviations can be widely used for many applications and some fields may need to be maintained locally in abbreviated form. Abbreviations are allowed in the Legacy fields, as those fields are to be maintained in synchronization with MSAG and ALI databases.

The use of abbreviations in the NG9-1-1 GIS data should not be confused with what telecommunicators see on their screens or what they need to type into their systems. Consult with the NG9-1-1 Core Services Provider regarding the software translation capabilities of the data input interfaces used by the telecommunicators.

2.5 NENA Globally Unique IDs (NGUIDs)

Each feature in a GIS data layer must be assigned a unique identifier so that when consolidated into a nationwide or global GIS dataset, the identifier is not duplicated. For NG9-1-1 GIS data layers, this identifier is known as a NENA Globally Unique Identifier (NGUID). The NGUID is created by combing a locally assigned

unique identifier (which can be numeric and/or text), the '@' symbol, and an Agency Identifier (which is a registered domain name in the public Domain Name System as defined in Internet Engineering Task Force RFC 1034 [2]).

It is important to note that in NG9-1-1, the PSAP Boundary layer is considered an Emergency Service Boundary layer. Thus, the PSAP Boundary layer and each Emergency Service Boundary layer use the same database field name (ES_NGUID) for their NGUID element. While an ES_NGUID value may be unique within its layer, without the proper checks in place, it is possible the same value may occur in the ES_NGUID field in another layer. Care should be taken to keep the ES_NGUID value for each feature in the PSAP, Law, Fire, EMS, and other Emergency Service Boundary layers truly unique across all layers. One way to do this is to add a prefix suggestive of the layer (e.g., PSAP, LAW, FIRE, EMS) to the locally assigned unique identifier. For example, the ES_NGUID for a PSAP polygon in Cass County's PSAP layer with a locally assigned unique identifier of 57311256 would be PSAP57311256@co.cass.mo.us.

2.6 Field Type

For simplicity, this standard identifies five field types (Text, Date, Short, Long, Float) that equate to the following NENA-defined field types:

Text Fields

P [Text] **–** Printable ASCII characters (decimal codes 32 to 126).

E [Text] **–** UTF 8 restricted to character sets designated by the 9-1-1 Authority, but not including pictographic characters. This allows for foreign names that require Latin letters not in the ASCII character set (e.g. Latin letters with tilde or grave accents).

U [Text] **–** A Uniform Resource Identifier (URI) as described in Section 17, Terminology, and defined in RFC 3986 [3][2], and also conforming to any rules specific to the scheme (e.g. sip:, https:, etc.) of the chosen URI. Consult with the NG9-1-1 Core Services Provider for requirements.

Date Field

D [Date] **–** Date and time. Information for a record represented as local time with offset from Coordinated Universal Time (UTC) as defined by the W3C "dateTime" datatype described in XML Schema Part 2: Datatypes Second Edition [4]. Since many GIS applications cannot currently utilize this format, local data may store the date and time in the local database date/time format, but time must include seconds and may be recorded to 0.1 seconds. Local data stored in a local database date/time format must be converted to the NENA-required format prior to use in NG9-1-1.

Number Fields

N [Short, Long] **–** Non-negative Integer, consisting of whole numbers only.

F [Float] **–** Floating (numbers that have a decimal place). There is no defined field length of a floating number; it is system dependent. These shall be double-precision fields.

2.7 Field Width

This is the maximum allowable field width, in number of characters.

2.8 Inclusion

Inclusion refers to the requirement for a field to be populated in a dataset to comply with the standard.

Mandatory: An attribute value must be provided for each record to comply with the standard.

Conditional: If an attribute value exists, it must be provided for each record to comply with the standard. If no value exists for the attribute, the data field is left blank.

Optional: An attribute value is not required to be populated.

2.9 Domains

A domain defines the set of valid values that are allowed in a data field. If the domain defines no values, then any value that matches the field type and description may be populated in the data field. This standard identifies several required domain tables (shown in italics in the Summary Tables below), some currently maintained by organizations within Missouri and others limited to values identified in external sources such as NENA and USPS (United States Postal Service). If a local value exists but is not included in an identified domain, submit the value with supporting documentation to the Missouri 9-1-1 Service Board for consideration of inclusion. The Missouri 9-1-1 Service Board will work with the appropriate organization to add the local values that meet the criteria for inclusion in the domains.

3 Road Centerline - Summary Table

The Road Centerline layer is an integral part of an NG9-1-1 GIS dataset. Its primary use is to validate civic address locations which are then used to determine the correct routing of live 9-1-1 calls in an NG9-1-1 environment.

Chart Legend

Element Type	Description	Color
Identification Elements	Data elements required for feature level identification	
Relate Elements	Data elements used to relate features to other features	
Address Elements	Data elements required for addressing	
Area Elements	Data elements used for location identification	
Functional Elements	Data elements used for functionality in supported systems	
Management Elements	Data elements required for feature level management	
9-1-1 Elements	Data elements required to support 9-1-1	

Element Number	Element Name	Database Field Name	Field Type	Field Width	Inclusion	Domain	Reference Standard
0 Identification Elements							
3.1.1	Road Centerline NENA Globally Unique ID	RCL_NGUID	TEXT	254	**Mandatory**		NENA
3.2 Relate Elements							
3.3 Address Elements							
3.3.1	Left Address Number Prefix	AdNumPre_L	TEXT	15	Conditional		NENA
3.3.2	Left FROM Address	FromAddr_L	LONG	6	**Mandatory**	Whole numbers from 0 to 999999	NENA
3.3.3	Left TO Address	ToAddr_L	LONG	6	**Mandatory**	Whole numbers from 0 to 999999	NENA
3.3.4	Right Address Number Prefix	AdNumPre_R	TEXT	15	Conditional		NENA
3.3.5	Right FROM Address	FromAddr_R	LONG	6	**Mandatory**	Whole numbers from 0 to 999999	NENA
3.3.6	Right TO Address	ToAddr_R	LONG	6	**Mandatory**	Whole numbers from 0 to 999999	NENA
3.3.7	Street Name Pre Modifier	St_PreMod	TEXT	15	Conditional		NENA
3.3.8	Street Name Pre Directional	St_PreDir	TEXT	9	Conditional		NENA
3.3.9	Street Name Pre Type	St_PreTyp	TEXT	50	Conditional	NENA *Street Name Pre Types and Street Name Post Types Registry [15]*	NENA

Element Number	Element Name	Database Field Name	Field Type	Field Width	Inclusion	Domain	Reference Standard
3.3.10	Street Name Pre Type Separator	St_PreSep	TEXT	20	Conditional	NENA *Street Name Pre Type Separators Registry [16]*	NENA
3.3.11	Street Name	St_Name	TEXT	60	**Mandatory**		NENA
3.3.12	Street Name Post Type	St_PosTyp	TEXT	50	Conditional	NENA *Street Name Pre Types and Street Name Post Types Registry [15]*	NENA
3.3.13	Street Name Post Directional	St_PosDir	TEXT	9	Conditional		NENA
3.3.14	Street Name Post Modifier	St_PosMod	TEXT	25	Conditional		NENA
3.3.15	Full Street Name	FullStNm	TEXT	245	Optional	Concatenated field for NG9-1-1 formatted street names including: *Street Name Pre Modifier, Street Name Pre Directional, Street Name Pre Type, Street Name Pre Type Separator, Street Name, Street Name Post Type, Street Name Post Directional,* and *Street Name Post Modifier*	
3.3.16	Legacy Full Street Name	LgFullStNm	TEXT	175	Optional	Concatenated field for legacy formatted street names including: *Legacy Street Name Pre Directional, Legacy Street Name, Legacy Street Name Type,* and *Legacy Street Name Post Directional*	
3.3.17	Legacy Street Name Pre Directional	LSt_PreDir	TEXT	2	Conditional		NENA
3.3.18	Legacy Street Name	LSt_Name	TEXT	75	Conditional		NENA
3.3.19	Legacy Street Name Type	LSt_Type	TEXT	4	Conditional	USPS Publication 28, Appendix C1	NENA
3.3.20	Legacy Street Name Post Directional	LSt_PosDir	TEXT	2	Conditional		NENA
3.3.21	Postal Code Left	PostCode_L	TEXT	7	Optional	USPS City State File Product	USPS, NENA
3.3.22	Postal Code Right	PostCode_R	TEXT	7	Optional	USPS City State File Product	USPS, NENA
3.3.23	Postal Community Name Left	PostComm_L	TEXT	40	Optional	USPS City State File Product	USPS, NENA
3.3.24	Postal Community Name Right	PostComm_R	TEXT	40	Optional	USPS City State File Product	USPS, NENA
3.4 Area Elements							
3.4.1	Country Left	Country_L	TEXT	2	**Mandatory**	ISO 3166-1 alpha-2 codes	NENA
3.4.2	Country Right	Country_R	TEXT	2	**Mandatory**	ISO 3166-1 alpha-2 codes	NENA
3.4.3	State Left	State_L	TEXT	2	**Mandatory**		US Census, NENA
3.4.4	State Right	State_R	TEXT	2	**Mandatory**		US Census, NENA
3.4.5	County Left	County_L	TEXT	40	**Mandatory**	*MONG911CountyDomain*	US Census, NENA
3.4.6	County Right	County_R	TEXT	40	**Mandatory**	*MONG911CountyDomain*	US Census, NENA

Element Number	Element Name	Database Field Name	Field Type	Field Width	Inclusion	Domain	Reference Standard
3.4.7	Incorporated Municipality Left	IncMuni_L	TEXT	100	**Mandatory**		NENA
3.4.8	Incorporated Municipality Right	IncMuni_R	TEXT	100	**Mandatory**		NENA
3.4.9	Unincorporated Community Left	UnincCom_L	TEXT	100	Optional		NENA
3.4.10	Unincorporated Community Right	UnincCom_R	TEXT	100	Optional		NENA
3.4.11	Neighborhood Community Left	NbrhdCom_L	TEXT	100	Optional		NENA
3.4.12	Neighborhood Community Right	NbrhdCom_R	TEXT	100	Optional		NENA
3.4.13	Additional Code Left	AddCode_L	TEXT	6	Conditional		NENA
3.4.14	Additional Code Right	AddCode_R	TEXT	6	Conditional		NENA
3.5 Functional Elements							
3.5.1	One-Way	OneWay	TEXT	2	Optional		NENA
0	Speed Limit	SpeedLimit	SHORT	3	Optional		NENA
3.5.3	Road Class	RoadClass	TEXT	15	Optional		NENA
3.6 Management Elements							
3.6.1	Date Updated	DateUpdate	DATE		**Mandatory**		NENA
3.6.2	Effective Date	Effective	DATE		Optional		NENA
3.6.3	Expiration Date	Expire	DATE		Optional		NENA
0 9-1-1 Elements							
3.7.1	Discrepancy Agency ID	DiscrpAgID	TEXT	75	**Mandatory**		NENA
3.7.2	Parity Left	Parity_L	TEXT	1	**Mandatory**	O, E, B, Z	NENA
3.7.3	Parity Right	Parity_R	TEXT	1	**Mandatory**	O, E, B, Z	NENA
3.7.4	ESN Left	ESN_L	TEXT	5	Conditional	Characters from 000 to 99999	NENA
3.7.5	ESN Right	ESN_R	TEXT	5	Conditional	Characters from 000 to 99999	NENA
3.7.6	MSAG Community Name Left	MSAGComm_L	TEXT	30	Conditional		NENA
3.7.7	MSAG Community Name Right	MSAGComm_R	TEXT	30	Conditional		NENA
3.7.8	Validation Left	Valid_L	TEXT	1	Optional		NENA
3.7.9	Validation Right	Valid_R	TEXT	1	Optional		NENA

Road Centerline - Data Element Details

3.1 Identification Elements

3.1.1 Road Centerline NENA Globally Unique ID

Database Field Name	RCL_NGUID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	254	Domain	
Examples	RCL47824393@co.polk.mo.us, RCL587392034@dentcounty.gov, RCL90a942e1bc7f4g1h94c5acaadv24r89h@countyofhenry.com		
Description	The NENA Globally Unique ID (NGUID) for a Road Centerline segment such that when merging Road Centerline data from other local 9-1-1 Authorities, this unique ID only occurs once. A Road Centerline NGUID is created by concatenating the locally assigned unique ID, the "@" symbol, and the Agency Identifier (a registered domain name). The locally assigned unique ID may be the RCL_ExtID, an autogenerated unique ID, or a manually generated unique ID. The Road Centerline NGUID is also used to relate to alternate street name records in the Street Name Alias Table.		

3.2 Relate Elements

Not applicable.

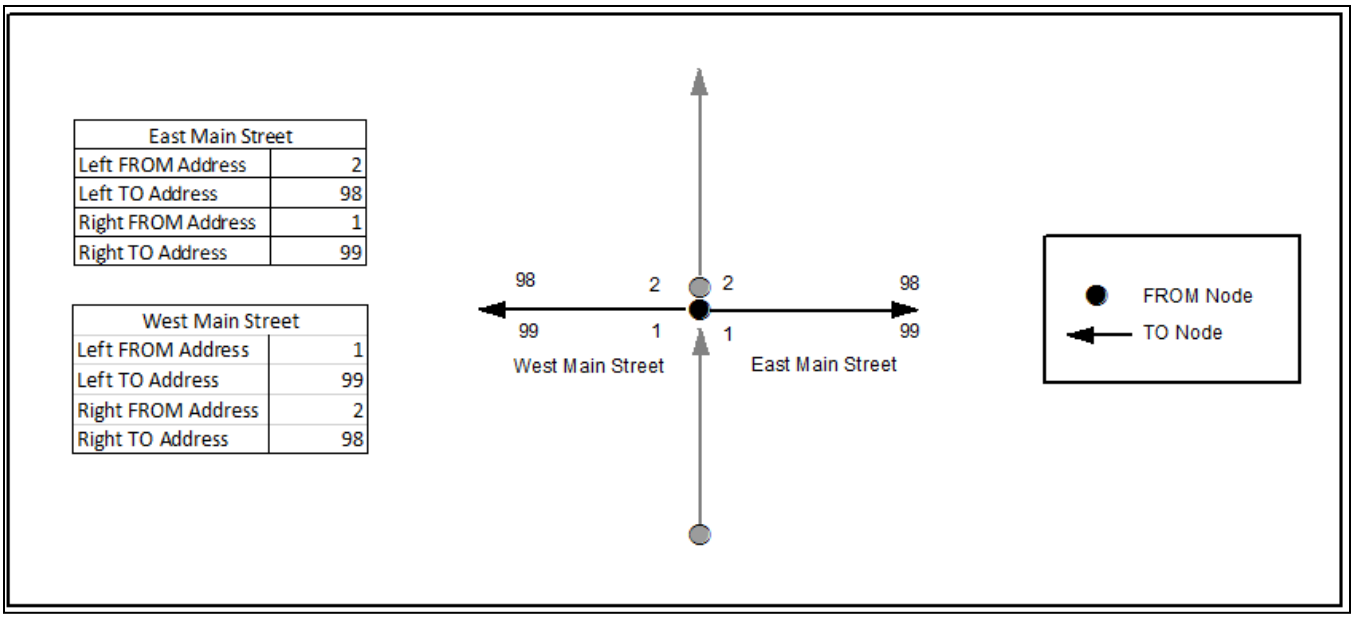
3.3 Address Elements

3.3.1 Left Address Number Prefix

Database Field Name	AdNumPre_L		
Data Type	TEXT	Inclusion	Conditional
Width	15	Domain	
Examples	N123, W123, N, W, S123W		
Description	An extension of the Left FROM Address or Left TO Address on the left side of the road segment consisting of the non-integer portion of the identifier for a parcel, house, building or other feature which precedes the address number, as defined by the official Addressing Authority for the given jurisdiction. Used to include the directional to an address number (e.g., **N**2554 Johnson Street). Also used in a few counties where grid address numbers exist to include the locally defined grid cell reference.		

3.3.2 Left FROM Address

Database Field Name	FromAddr_L		
Data Type	LONG	Inclusion	**Mandatory**
Width	6	Domain	Whole numbers from 0 to 999999
Examples	123		
Description	The beginning value of the address range on the left side of the road segment at the FROM node (begin point). This value can be higher than the Left TO Address.		



Example of Left FROM, Left TO, Right FROM, and Right TO Addresses

3.3.3 Left TO Address

Database Field Name	ToAddr_L		
Data Type	LONG	Inclusion	**Mandatory**
Width	6	Domain	Whole numbers from 0 to 999999
Examples	123		
Description	The ending value of the address range on the left side of the road segment at the TO node (endpoint). This value can be lower than the Left FROM Address.		

3.3.4 Right Address Number Prefix

Database Field Name	AdNumPre_R		
Data Type	TEXT	Inclusion	Conditional
Width	15	Domain	
Examples	N123, W123, N, W, S123W		
Description	An extension of the Right FROM Address or Right TO Address on the right side of the road segment, consisting of the non-integer portion of the identifier for a parcel, house, building or other feature which precedes the address number, as defined by the official Addressing Authority for the given jurisdiction. Used to include the directional to an address number (e.g., **N**2554 Johnson Street). Also used in a few counties where grid address numbers exist to include the locally defined grid cell reference.		

3.3.5 Right FROM Address

Database Field Name	FromAddr_R		
Data Type	LONG	Inclusion	**Mandatory**
Width	6	Domain	Whole numbers from 0 to 999999
Examples	123		
Description	The beginning value of the address range on the right side of the road segment at the FROM node (begin point). This value can be higher than the Right TO Address.		

3.3.6 Right TO Address

Database Field Name	ToAddr_R		
Data Type	LONG	Inclusion	**Mandatory**
Width	6	Domain	Whole numbers from 0 to 999999
Examples	123		
Description	The ending value of the address range on the right side of the road segment at the TO node (endpoint). This value can be lower than the Right FROM Address.		

3.3.7 Street Name Pre Modifier

Database Field Name	St_PreMod		
Data Type	TEXT	Inclusion	Conditional
Width	15	Domain	
Examples	**Old** North Highway 63		
Description	A word or phrase that precedes all other Street Name elements and is separated from the Street Name element by a Street Name Pre Directional and/or a Street Name Pre Type element. Not commonly used and use should be minimized.		

3.3.8 Street Name Pre Directional

Database Field Name	St_PreDir		
Data Type	TEXT	Inclusion	Conditional
Width	9	Domain	
Examples	**East** Main Street, Old **North** Highway 63		
Description	A word or phrase preceding the Street Name element that indicates the direction taken by the road from an arbitrary starting point or the sector where it is located.		

3.3.9 Street Name Pre Type

Database Field Name	St_PreTyp		
Data Type	TEXT	Inclusion	Conditional
Width	50	Domain	*NENA Street Name Pre Types and Street Name Post Types Registry [15]*
Examples	**Avenue** A, Old North **Highway** 63, **United States Highway** 40, **State Highway** 266, **State Highway** AB, **Interstate** 70, **Route** K, **Highway** 124, **County Road** 443		
Description	A word or phrase that precedes the Street Name element and identifies the type of thoroughfare in the Full Street Name.		

3.3.10 Street Name Pre Type Separator

Database Field Name	St_PreSep		
Data Type	TEXT	Inclusion	Conditional
Width	20	Domain	*NENA Street Name Pre Type Separators Registry [16]*
Examples	Avenue **of the** Columns, Avenue **of** Champions		
Description	A preposition or prepositional phrase between the Street Name Pre Type and the Street Name element.		

3.3.11 Street Name

Database Field Name	St_Name		
Data Type	TEXT	Inclusion	**Mandatory**
Width	60	Domain	
Examples	**Jones** Road, Highway **U**, Avenue of the **Columns**, Avenue **C**, **Azure** Court South		
Description	The official name of the road as defined by the official Street Naming Authority for the given jurisdiction. The Street Name element does not include a street type, directional, or modifier unless assigned as such by the official Street Naming Authority.		

3.3.12 Street Name Post Type

Database Field Name	St_PosTyp		
Data Type	TEXT	Inclusion	Conditional
Width	50	Domain	*NENA Street Name Pre Types and Street Name Post Types Registry [15]*
Examples	Jones **Road**, Azure **Court** South		
Description	A word or phrase that follows the Street Name element and identifies the type of thoroughfare in the Full Street Name.		

3.3.13 Street Name Post Directional

Database Field Name	St_PosDir		
Data Type	TEXT	Inclusion	Conditional
Width	9	Domain	
Examples	Azure Court **South**, 10th Avenue **West**		
Description	A word or phrase following the Street Name element that indicates the direction taken by the road from an arbitrary starting point or the sector where it is located.		

3.3.14 Street Name Post Modifier

Database Field Name	St_PosMod		
Data Type	TEXT	Inclusion	Conditional
Width	25	Domain	
Examples	Highway 63 **Connector,** Buttonwood Drive **Access**, Lake Road **Fire Road 8**, United States Highway 71 West **Frontage Road**, Interstate 70 **westbound**		
Description	A word or phrase that follows all other Street Name elements and is separated from the Street Name element by a Street Name Post Directional and/or Street Name Post Type element. Not commonly used and use should be minimized.		

3.3.15 Full Street Name

Database Field Name	FullStNm		
Data Type	TEXT	Inclusion	**Mandatory**
Width	245	Domain	
Examples	Old North Highway 63, Azure Court South, Lake Road Fire Road 8		
Description	The Street Name with all Pre/Post Modifiers, Pre/Post Directionals, Pre Type Separator, and Pre/Post Types concatenated: St_PreMod + St_PreDir + St_PreTyp + St_PreSep + St_Name + St_PosTyp + St_PosDir + St_PosMod		

3.3.16 Legacy Full Street Name

Database Field Name	LgFullStNm		
Data Type	TEXT	Inclusion	Optional
Width	175	Domain	
Examples	OLD N HWY 63, AZURE CT S, LAKE RD FIRE RD 8		
Description	The Full Street Name with abbreviations (where appropriate) based on Legacy Street Name Pre Directional, Legacy Street Name, Legacy Street Name Type, and Legacy Street Name Post Directional		

3.3.17 Legacy Street Name Pre Directional

Database Field Name	LSt_PreDir		
Data Type	TEXT	Inclusion	Conditional
Width	2	Domain	
Examples	**E** MAIN ST, **S** ELMWOOD DR		
Description	The street direction prefix as it appears in the MSAG, as assigned by the official Street Naming Authority. Casing should reflect what appears in the MSAG data.		

3.3.18 Legacy Street Name

Database Field Name	LSt_Name		
Data Type	TEXT	Inclusion	Conditional
Width	75	Domain	
Examples	E **MAIN** ST, S **ELMWOOD** DR, **I 70**, **HWY U**, **10TH** AVE W, **AZURE** CT S		
Description	The street name field as it appears in the MSAG, as assigned by the official Street Naming Authority. Casing should reflect what appears in the MSAG data.		

3.3.19 Legacy Street Name Type

Database Field Name	LSt_Type		
Data Type	TEXT	Inclusion	Conditional
Width	4	Domain	USPS Publication 28, Appendix C1 [5]
Examples	E MAIN **ST**, S ELMWOOD **DR**, 10TH **AVE** W, AZURE **CT** S		
Description	The valid street type abbreviation as it appears in the MSAG, as assigned by the official Street Naming Authority. Casing should reflect what appears in the MSAG data.		

3.3.20 Legacy Street Name Post Directional

Database Field Name	LSt_PosDir		
Data Type	TEXT	Inclusion	Conditional
Width	2	Domain	
Examples	10TH AVE **W**, AZURE CT **S**		
Description	The street direction suffix as it appears in the MSAG, as assigned by the official Street Naming Authority. Casing should reflect what appears in the MSAG data.		

3.3.21 Postal Code Left

Database Field Name	PostCode_L		
Data Type	TEXT	Inclusion	Optional
Width	7	Domain	USPS City State File Product [6]
Examples	64111, 63021		
Description	The 5-digit code on the left side of the road segment that identifies the individual US Post Office or metropolitan area delivery station associated with the addresses on that side of the road.		

3.3.22 Postal Code Right

Database Field Name	PostCode_R		
Data Type	TEXT	Inclusion	Optional
Width	7	Domain	USPS City State File Product [6]
Examples	64111, 63021		
Description	The 5-digit code on the right side of the road segment that identifies the individual US Post Office or metropolitan area delivery station associated with the addresses on that side of the road.		

3.3.23 Postal Community Name Left

Database Field Name	PostComm_L		
Data Type	TEXT	Inclusion	Optional
Width	40	Domain	USPS City State File Product [6]
Examples	Kansas City, Columbia, Springfield, Cape Girardeau		
Description	The name on the left side of the road segment recognized by the USPS as valid for the ZIP Code of the addresses on that side of the road.		

3.3.24 Postal Community Name Right

Database Field Name	PostComm_R		
Data Type	TEXT	Inclusion	Optional
Width	40	Domain	USPS City State File Product [6]
Examples	Kansas City, Columbia, Springfield, Cape Girardeau		
Description	The name on the right side of the road segment recognized by the USPS as valid for the ZIP Code of the addresses on that side of the road.		

3.4 Area Elements

3.4.1 Country Left

Database Field Name	Country_L		
Data Type	TEXT	Inclusion	**Mandatory**
Width	2	Domain	Restricted to the two-letter codes in ISO 3166-1 alpha-2 codes
Examples	US, CA		
Description	The two-letter abbreviation of the Country on the left side of the road segment where the address is located. Must be in uppercase.		

3.4.2 Country Right

Database Field Name	Country_R		
Data Type	TEXT	Inclusion	**Mandatory**
Width	2	Domain	Restricted to the two-letter codes in ISO 3166-1 alpha-2 codes
Examples	US, CA		
Description	The two-letter abbreviation of the Country on the right side of the road segment where the address is located. Must be in uppercase.		

3.4.3 State Left

Database Field Name	State_L		
Data Type	TEXT	Inclusion	**Mandatory**
Width	2	Domain	Restricted to the two-letter codes in ISO 3166-2
Examples	MO, AR, IL, IA, KS, KY, NE, OK, TN		
Description	The two-letter abbreviation of the State on the left side of the road segment where the address is located. Must be in uppercase.		

3.4.4 State Right

Database Field Name	State_R		
Data Type	TEXT	Inclusion	**Mandatory**
Width	2	Domain	Restricted to the two-letter codes in ISO 3166-2
Examples	MO, AR, IL, IA, KS, KY, NE, OK, TN		
Description	The two-letter abbreviation of the State on the right side of the road segment where the address is located. Must be in uppercase.		

3.4.5 County Left

Database Field Name	County_L		
Data Type	TEXT	Inclusion	**Mandatory**
Width	40	Domain	Restricted to the values in ANSI INCITS 31:2009, including casing and abbreviations [7] *MONG911CountyDomain*
Examples	Dent County, Jefferson County		
Description	The name of the County on the left side of the road segment where the address is located.		

3.4.6 County Right

Database Field Name	County_R		
Data Type	TEXT	Inclusion	**Mandatory**
Width	40	Domain	Restricted to the values in ANSI INCITS 31:2009, including casing and abbreviations [7] *MONG911CountyDomain*
Examples	Dent County, Jefferson County		
Description	The name of the County on the right side of the road segment where the address is located.		

3.4.7 Incorporated Municipality Left

Database Field Name	IncMuni_L		
Data Type	TEXT	Inclusion	**Mandatory**
Width	100	Domain	
Examples	Stella, Warsaw, Loch Lloyd, Jefferson City, Kansas City, Unincorporated		
Description	The name of the Incorporated Municipality on the left side of the road segment where the address is located, including the incorporated municipality type. If segments are in unincorporated areas, they should be populated with "UNINCORPORATED"		

3.4.8 Incorporated Municipality Right

Database Field Name	IncMuni_R		
Data Type	TEXT	Inclusion	**Mandatory**
Width	100	Domain	
Examples	Stella, Warsaw, Loch Lloyd, Jefferson City, Kansas City, Unincorporated		
Description	The name of the Incorporated Municipality on the right side of the road segment where the address is located, including the incorporated municipality type. If segments are in unincorporated areas, they should be populated with "UNINCORPORATED"		

3.4.9 Unincorporated Community Left

Database Field Name	UnincCom_L		
Data Type	TEXT	Inclusion	Optional
Width	100	Domain	
Examples	Prathersville, Globe, Tebbetts		
Description	The name of the Unincorporated Community on the left side of the road segment where the address is located.		

3.4.10 Unincorporated Community Right

Database Field Name	UnincCom_R		
Data Type	TEXT	Inclusion	Optional
Width	100	Domain	
Examples	Prathersville, Globe, Tebbetts		
Description	The name of the Unincorporated Community on the right side of the road segment where the address is located.		

3.4.11 Neighborhood Community Left

Database Field Name	NbrhdCom_L		
Data Type	TEXT	Inclusion	Optional
Width	100	Domain	
Examples	The Hill, Soulard, Forest Park		
Description	The name of an unincorporated neighborhood, subdivision, or area within an incorporated municipality on the left side of the road segment where the address point is located. Neighborhood communities are only used when they are known and have a clearly defined boundary.		

3.4.12 Neighborhood Community Right

Database Field Name	NbrhdCom_R		
Data Type	TEXT	Inclusion	Optional
Width	100	Domain	
Examples	The Hill, Soulard, Forest Park		
Description	The name of an unincorporated neighborhood, subdivision, or area within an incorporated municipality on the right side of the road segment where the address point is located. Neighborhood communities are only used when they are known and have a clearly defined boundary.		

3.4.13 Additional Code Left

Database Field Name	AddCode_L		
Data Type	TEXT	Inclusion	Conditional
Width	6	Domain	
Examples			
Description	A Standard Geographical Classification code used in Canada that specifies a geographic area and is used to differentiate two municipalities with the same name in a province that does not have counties. **Note:** Since this field is not applicable in the US, it will not be populated in MO GIS data layers		

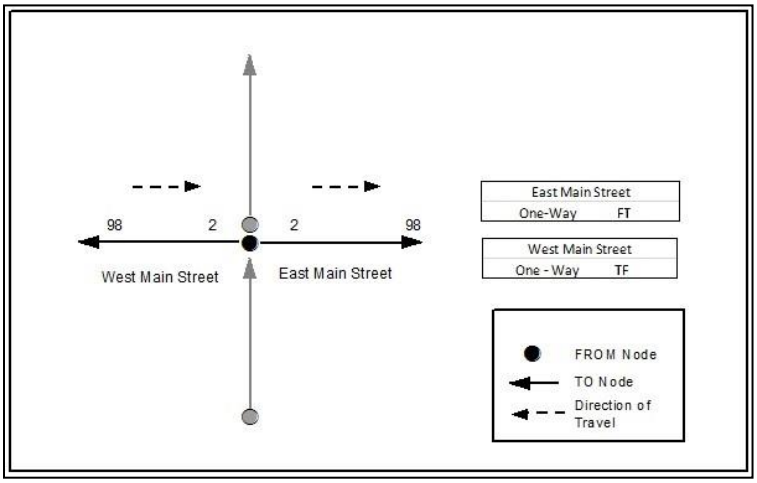
3.4.14 Additional Code Right

Database Field Name	AddCode_R		
Data Type	TEXT	Inclusion	Conditional
Width	6	Domain	
Examples			
Description	A Standard Geographical Classification code used in Canada that specifies a geographic area and is used to differentiate two municipalities with the same name in a province that does not have counties. **Note:** Since this field is not applicable in the US, it will not be populated in MO GIS data layers		

3.5 Functional Elements

3.5.1 One-Way

Database Field Name	OneWay		
Data Type	TEXT	Inclusion	Optional
Width	2	Domain	B, TF, FT
Examples	B, FT, TF		
Description	The direction of traffic movement along a road in relation to the FROM node and TO node of the road segment where: B (Travel allowed in both directions) FT (One-way, travel from FROM node to TO node) TF (One-way, travel from TO node to FROM node)		



Example of OneWay attribution

3.5.2 Speed Limit

Database Field Name	SpeedLimit		
Data Type	SHORT	Inclusion	Optional
Width	3	Domain	
Examples	10, 25, 30, 55, 65		
Description	The posted predominate speed limit of the road segment.		

3.5.3 Road Class

Database Field Name	RoadClass		
Data Type	TEXT	Inclusion	Optional
Width	15	Domain	Primary, Secondary, Local, Ramp, Service Drive, Vehicular Trail, Walkway, Stairway, Alley, Private, Parking Lot, Trail, Bridle Path, Other
Examples	Primary, Secondary, Local, Ramp, Alley, Private, Trail		
Description	The general description of the type of road. These values are based on road classification definitions from the Census MAF/TIGER Feature Class Codes (MTFCC) at https://www.census.gov/library/reference/code-lists/mt-feature-class-codes.html. • *Primary* roads are limited-access highways that connect to other roads only at interchanges and not at at-grade intersections. This classification includes interstate highways and other highways with limited access, some of which are toll roads. • *Secondary* roads are main arteries that are not limited access, usually in the US Highway, State Highway, or County Highway system. These roads have one or more lanes of traffic in each direction, may or may not be divided, and usually have at grade intersections with many other roads and driveways. • *Local* roads are generally a paved non-arterial street, road, or byway that usually has a single lane of traffic in each direction. This classification includes neighborhood, rural roads, city streets, and some unpaved roads. • *Ramp* is a road that allows controlled access from adjacent roads onto a limited access highway, often in the form of a cloverleaf interchange. • Service Drive is a road, usually paralleling a limited access highway, that provides access to structures and/or service facilities along the highway. These roads can be named and may intersect with other roads. • *Vehicular Trail* (4WD, snowmobile) is an unpaved dirt trail where a four-wheel drive vehicle, snowmobile, or similar vehicle is required. • *Walkway* (Pedestrian Trail, Boardwalk) is a path that is used for walking, being either too narrow for or legally restricted from vehicular traffic. • *Stairway* is a pedestrian passageway from one level to another by a series of steps. • *Alley* is a service road that does not generally have associated addressed structures and is usually unnamed. It is located at the rear of buildings and properties. • *Private* (service vehicles, logging, oil fields, ranches, etc.) is a road within private property that is privately maintained for service, extractive, or other purposes. These roads are often unnamed. • *Parking Lot* is the main travel route for vehicles through a paved parking area. • *Trail* (Ski, Bike, Walking/Hiking Trail) is generally a path used by human powered modes of transportation. • *Bridle Path* is a path that is used for horses, being either too narrow for or legally restricted from vehicular traffic. • *Other* is any road or path type that does not fit into the above categories.		

3.6 Management Elements

3.6.1 Date Updated

Database Field Name	DateUpdate		
Data Type	DATE	Inclusion	**Mandatory**
Width		Domain	
Examples	2020-01-28T15:47.09.3-06:00 (representing a record updated on January 28, 2020 at 3:47 and 9.3 seconds PM US Central Standard Time, with a precision of .1 second); 2020-07-16T08:31:15.2-05:00 (representing a record updated on July 16, 2020 at 8:31 and 15.2 seconds AM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record was created or last modified. If the record/feature was created or modified prior to implementing edit tracking, then any valid date prior to NG9-1-1 transition can be used.		

3.6.2 Effective Date

Database Field Name	Effective		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will become active on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will become active on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record is scheduled to take effect (e.g., the date and time an annexation takes effect and a copy of the road centerlines within the annexed area that have had their Incorporated Municipality, ESN, and MSAG Community Name fields populated with the new values are recognized for use in the NG9-1-1 system).		

3.6.3 Expiration Date

Database Field Name	Expire		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will expire and no longer be valid on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will expire and no longer be valid on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time when the information in the record is no longer considered valid (e.g., the date and time an annexation takes effect and the road centerlines within the annexed area that have their Incorporated Municipality, ESN, and MSAG Community Name fields populated with the former values are no longer recognized for use in the NG9-1-1 system).		

3.7 9-1-1 Elements

3.7.1 Discrepancy Agency ID

Database Field Name	DiscrpAgID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	75	Domain	
Examples	co.clay.mo.us, jacksoncounty.gov, countyofboone.com		
Description	The Agency Identifier (a registered domain name) for the agency that is responsible for receiving a Discrepancy Report and sufficiently resolving the discrepancy, should a discrepancy be discovered in the GIS data layer. This shall be the agency responsible for provisioning the GIS data layer to the Spatial Interface (SI) or to the SI Provider and may be the same agency as the locally appointed 9-1-1 Authority. If a PSAP does not have a registered domain name, the NG9-1-1 Core Service provider can provide assistance during transition.		

3.7.2 Parity Left

Database Field Name	Parity_L		
Data Type	TEXT	Inclusion	**Mandatory**
Width	1	Domain	O, E, B, Z
Examples	O, E, B, Z		
Description	The even or odd property of the address number range on the left side of the road segment relative to the FROM Node where: O (only Odd addresses in the address range) E (only Even addresses in the address range) B (Both Even and Odd addresses in the address range) Z (Address Range is 0-0)		

3.7.3 Parity Right

Database Field Name	Parity_R		
Data Type	TEXT	Inclusion	**Mandatory**
Width	1	Domain	O, E, B, Z
Examples	O, E, B, Z		
Description	The even or odd property of the address number range on the left side of the road segment relative to the FROM Node where: O (only Odd addresses in the address range) E (only Even addresses in the address range) B (Both Even and Odd addresses in the address range) Z (Address Range is 0-0)		

3.7.4 ESN Left

Database Field Name	ESN_L		
Data Type	TEXT	Inclusion	Conditional
Width	5	Domain	Characters from 000 to 99999
Examples	35, 810, 7115		
Description	A 3-5-character alphanumeric string that represents the Emergency Service Zone (ESZ) on the left side of the road segment relative to the FROM Node. ESZ is used for 10-digit routing in Legacy Systems and is not used in a full NG9-1-1 implementation.		

3.7.5 ESN Right

Database Field Name	ESN_R		
Data Type	TEXT	Inclusion	Conditional
Width	5	Domain	Characters from 000 to 99999
Examples	35, 810, 7115		
Description	A 3-5-character alphanumeric string that represents the Emergency Service Zone (ESZ) on the right side of the road segment relative to the FROM Node. ESZ is used for 10-digit routing in Legacy Systems and is not used in a full NG9-1-1 implementation.		

3.7.6 MSAG Community Name Left

Database Field Name	MSAGComm_L		
Data Type	TEXT	Inclusion	Conditional
Width	30	Domain	
Examples	Springfield, Liberty, Kansas City		
Description	The Community name on the left side of the road segment relative to the FROM Node, as it appears in the MSAG. This may or may not be the same as the Postal Community Name used by the US Postal Service.		

3.7.7 MSAG Community Name Right

Database Field Name	MSAGComm_R		
Data Type	TEXT	Inclusion	Conditional
Width	30	Domain	
Examples	Springfield, Liberty, Kansas City		
Description	The Community name on the right side of the road segment relative to the FROM Node, as it appears in the MSAG. This may or may not be the same as the Postal Community Name used by the US Postal Service.		

3.7.8 Validation Left

Database Field Name	Valid_L		
Data Type	TEXT	Inclusion	Optional
Width	1	Domain	
Examples	Y, N		
Description	Indicates if the address range on the left side of the road segment should be used for civic location validation. A value of “Y” means the Road Centerline layer can be used for address validation and therefore any Address Number within the address range on the left side of the road segment should be considered by the LVF to be valid. A value of “N” means the Road Centerline layer should not be used for validation and an Address Number within the address range on the left side of the road segment should only be validated using the Site/Structure Address Point layer. If no values are populated, a value of “Y” is assumed.		

3.7.9 Validation Right

Database Field Name	Valid_R		
Data Type	TEXT	Inclusion	Optional
Width	1	Domain	
Examples	Y, N		
Description	Indicates if the address range on the right side of the road segment should be used for civic location validation. A value of “Y” means the Road Centerline layer can be used for address validation and therefore any Address Number within the address range on the right side of the road segment should be considered by the LVF to be		

	valid. A value of "N" means the Road Centerline layer should not be used for validation and an Address Number within the address range on the right side of the road segment should only be validated using the Site/Structure Address Point layer. If no values are populated, a value of "Y" is assumed.

4 Site/Structure Address Point - Summary Table

Site/Structure Address Points represent the locations of sites or structures, or the location of access to sites, structures, or landmarks. There is no requirement for the completeness of the data even though it is a required layer. Address points can be used to properly locate sites that otherwise would not accurately be locate in the road centerline geocoding process. (e.g., odd addresses on even side of the road centerlines and vice versa).

Chart Legend

Element Type	Description	Color
Identification Elements	Data elements required for feature level identification	
Relate Elements	Data elements used to relate features to other features	
Address Elements	Data elements required for addressing	
Area Elements	Data elements used for location identification	
Functional Elements	Data elements used for functionality in supported systems	
Management Elements	Data elements required for feature level management	
9-1-1 Elements	Data elements required to support 9-1-1	

Element Number	Element Name	Database Field Name	Field Type	Field Width	Inclusion	Domain	Reference Standard
4.1 Identification Elements							
4.1.1	Site NENA Globally Unique ID	Site_NGUID	TEXT	254	**Mandatory**		NENA
4.2 Relate Elements							
4.2.1	Road Centerline NENA Globally Unique ID	RCL_NGUID	TEXT	254	**Mandatory**		NENA
4.3 Address Elements							
4.3.1	Address Number Prefix	AddNum_Pre	TEXT	15	Conditional		NENA
4.3.2	Address Number	Add_Number	LONG	6	Conditional	Whole numbers from 0 to 999999	NENA
4.3.3	Address Number Suffix	AddNum_Suf	TEXT	15	Conditional		NENA
4.3.4	Complete Landmark Name	LandmkName	TEXT	150	Conditional		NENA
4.3.5	Mile Post	Mile_Post	TEXT	150	Conditional		NENA
4.3.6	Building	Building	TEXT	75	Optional		NENA
4.3.7	Floor	Floor	TEXT	75	Optional		NENA
4.3.8	Unit	Unit	TEXT	75	Optional		NENA
4.3.9	Room	Room	TEXT	75	Optional		NENA
4.3.10	Seat	Seat	TEXT	75	Optional		NENA
4.3.11	Additional Location Information	Addtl_Loc	TEXT	225	Optional		NENA
4.3.12	Street Name Pre Modifier	St_PreMod	TEXT	15	Conditional		NENA
4.3.13	Street Name Pre Directional	St_PreDir	TEXT	9	Conditional		NENA
4.3.14	Street Name Pre Type	St_PreTyp	TEXT	50	Conditional	NENA *Street Name Pre Types and Street Name Post Types Registry [15]*	NENA
4.3.15	Street Name Pre Type Separator	St_PreSep	TEXT	20	Conditional	NENA *Street Name Pre Type Separators Registry [16]*	NENA
4.3.16	Street Name	St_Name	TEXT	60	Conditional		NENA

Element Number	Element Name	Database Field Name	Field Type	Field Width	Inclusion	Domain	Reference Standard
4.3.17	Street Name Post Type	St_PosTyp	TEXT	50	Conditional	NENA *Street Name Pre Types and Street Name Post Types Registry [15]*	NENA
4.3.18	Street Name Post Directional	St_PosDir	TEXT	9	Conditional		NENA
4.3.19	Street Name Post Modifier	St_PosMod	TEXT	25	Conditional		NENA
4.3.20	Full Street Name	FullStNm	TEXT	245	**Mandatory**	Concatenated field for NG9-1-1 formatted street names including: *Street Name Pre Modifier, Street Name Pre Directional, Street Name Pre Type, Street Name Pre Type Separator, Street Name, Street Name Post Type, Street Name Post Directional,* and *Street Name Post Modifier*	
4.3.21	Legacy Full Street Name	LgFullStNm	TEXT	175	Optional	Concatenated field for legacy formatted street names including: *Legacy Street Name Pre Directional, Legacy Street Name, Legacy Street Name Type,* and *Legacy Street Name Post Directional*	
4.3.22	Legacy Street Name Pre Directional	LSt_PreDir	TEXT	2	Conditional		NENA
4.3.23	Legacy Street Name	LSt_Name	TEXT	75	Conditional		NENA
4.3.24	Legacy Street Name Type	LSt_Type	TEXT	4	Conditional	USPS Publication 28, Appendix C1	NENA
4.3.25	Legacy Street Name Post Directional	LSt_PosDir	TEXT	2	Conditional		NENA
4.3.26	Postal Code	Post_Code	TEXT	7	Optional	USPS City State File Product	USPS, NENA
4.3.27	ZIP Plus 4	Post_Code4	TEXT	4	Optional	USPS City State File Product	USPS, NENA
4.3.28	Postal Community Name	Post_Comm	TEXT	40	Optional	USPS City State File Product	USPS, NENA
4.4 Area Elements							
4.4.1	Country	Country	TEXT	2	**Mandatory**	ISO 3166-1 alpha-2 codes	NENA
4.4.2	State	State	TEXT	2	**Mandatory**		US Census, NENA
4.4.3	County	County	TEXT	40	**Mandatory**	*MONG911CountyDomain*	US Census, NENA
4.4.4	Incorporated Municipality	Inc_Muni	TEXT	100	**Mandatory**		US Census, NENA
4.4.5	Unincorporated Community	Uninc_Comm	TEXT	100	Optional		NENA
4.4.6	Neighborhood Community	Nbrhd_Comm	TEXT	100	Optional		NENA
4.4.7	Additional Code	AddCode	TEXT	6	Conditional		NENA
4.5 Functional Elements							
4.5.1	Placement Method	Placement	TEXT	25	Optional	NENA *Site/Structure Address Point Placement Method Registry*	NENA

Element Number	Element Name	Database Field Name	Field Type	Field Width	Inclusion	Domain	Reference Standard
4.5.2	Place Type	Place_Type	TEXT	50	Optional		NENA
4.5.3	Additional Data URI	AddDataURI	TEXT	254	Conditional		NENA
4.6 Management Elements							
4.6.1	Date Updated	DateUpdate	DATE		**Mandatory**		NENA
4.6.2	Effective Date	Effective	DATE		Optional		NENA
4.6.3	Expiration Date	Expire	DATE		Optional		NENA
4.7 9-1-1 Elements							
4.7.1	Discrepancy Agency ID	DiscrpAgID	TEXT	75	**Mandatory**		NENA
4.7.2	ESN	ESN	TEXT	5	Conditional	Characters from 000 to 99999	NENA
4.7.3	MSAG Community Name	MSAGComm	TEXT	30	Conditional		NENA
4.7.4	Latitude	Lat	FLOAT		Optional		NENA
4.7.5	Longitude	Long	FLOAT		Optional		NENA
4.7.6	Elevation	Elev	LONG	6	Optional		NENA

Site/Structure Address Point - Data Element Details

4.1 Identification Elements

4.1.1 Site NENA Globally Unique ID

Database Field Name	Site_NGUID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	254	Domain	
Examples	SSAP17342239@co.polk.mo.us, SSAP100373182@dentcounty.gov, SSAP44f161f2jk7f4g1v45b1hgaw71av189c@countyofhenry.com		
Description	The NENA Globally Unique ID (NGUID) for a Site/Structure Address Point such that when coalescing Site/Structure Address Point data from other local 9-1-1 Authorities, this unique ID only occurs once. A Site/Structure Address Point NGUID is created by concatenating the locally assigned unique ID, the "@" symbol, and the Agency Identifier (a registered domain name). The locally assigned unique ID may be an autogenerated unique ID, or a manually generated unique ID.		

4.2 Relate Elements

4.2.1 Road Centerline NENA Globally Unique ID

Database Field Name	RCL_NGUID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	254	Domain	
Examples	RCL47824393@co.polk.mo.us, RCL587392034@dentcounty.gov, RCL90a942e1bc7f4g1h94c5acaadv24r89h@countyofhenry.com		
Description	The NENA Globally Unique ID (NGUID) for the Road Centerline segment that the Address Point record is associated with. The Road Centerline NGUID is also used to relate to alternate street name records in the Street Name Alias Table.		

4.3 Address Elements

4.3.1 Address Number Prefix

Database Field Name	AddNum_Pre		
Data Type	TEXT	Inclusion	Conditional
Width	15	Domain	
Examples	N123, W123, N, W, S123W		
Description	The non-integer portion of the identifier for a parcel, house, building or other feature which precedes the address number, as defined by the official Addressing Authority for the given jurisdiction. Used to include the directional to an address number (e.g., **N**2554 Johnson Street). Also used in a few counties where grid address numbers exist to include the locally-defined grid cell reference.		

4.3.2 Address Number

Database Field Name	Add_Number		
Data Type	LONG	Inclusion	Conditional
Width	6	Domain	Whole numbers from 0 to 999999
Examples	123, 10546		
Description	The numeric identifier for a parcel, house, building or other feature, as defined by the official Addressing Authority for a given jurisdiction.		

4.3.3 Address Number Suffix

Database Field Name	AddNum_Suf		
Data Type	TEXT	Inclusion	Conditional
Width	15	Domain	
Examples	A, 1/2		
Description	The non-integer portion of the identifier for a parcel, house, building or other feature which follows the address number, as defined by the official Addressing Authority for a given jurisdiction. Not commonly used and use should be minimized. Not to be confused with Unit divisions within a building.		

4.3.4 Complete Landmark Name

Database Field Name	LandmkName		
Data Type	TEXT	Inclusion	Conditional
Width	150	Domain	
Examples	Ha Ha Tonka Castle Ruins, The Gateway Arch, Busch Stadium, Fort Leonard Wood Main Gate		
Description	The name by which a prominent site or structure is publicly known, and which may or may not be associated with a civic address. **Note:** This element may be impacted by a potential future change in NENA Standards. See Section 10 for more information.		

4.3.5 Mile Post

Database Field Name	Mile_Post		
Data Type	TEXT	Inclusion	Conditional
Width	150	Domain	
Examples	Mile Marker 186.0, MM_10		
Description	A measured distance travelled along a road, highway, trail, navigable waterway, or other unaddressed route, from a given point, that is typically posted with a milepost sign, a mile marker sign, or other marker. Mile Post numbers may be used in place of, or in addition to, Address Numbers.		

4.3.6 Building

Database Field Name	Building		
Data Type	TEXT	Inclusion	Optional
Width	75	Domain	
Examples	Building 1, Building 2, Tower A, Tower B		
Description	The type (e.g., Building, Tower) and identifier (e.g., 2, B) for a building among a group of buildings that have the same Address Number and Full Street Name. **Note:** This element may be impacted by a potential future change in NENA Standards. See Section 10 for more information.		

4.3.7 Floor

Database Field Name	Floor		
Data Type	TEXT	Inclusion	Optional
Width	75	Domain	
Examples	Floor 4, First Floor, 11, Mezzanine		
Description	The floor, story, or level within a building.		

4.3.8 Unit

Database Field Name	Unit		
Data Type	TEXT	Inclusion	Optional
Width	75	Domain	
Examples	Suite 2102, Apartment 3C, Unit 12, Penthouse		
Description	The type (e.g., Apartment, Unit) and identifier (e.g., 101, F) for a group or suite of rooms within a building that are under common ownership or tenancy, typically having a common primary entrance. **Note:** This element may be impacted by a potential future change in NENA Standards. See Section 10 for more information.		

4.3.9 Room

Database Field Name	Room		
Data Type	TEXT	Inclusion	Optional
Width	75	Domain	
Examples	Room 101A, 1202, E, Capitol Ballroom		
Description	The name or identifier of a single room within a building.		

4.3.10 Seat

Database Field Name	Seat		
Data Type	TEXT	Inclusion	Optional
Width	75	Domain	
Examples	1, 2, A, B, Registration Desk, Cubicle D6		
Description	An individual seat location.		

4.3.11 Additional Location Information

Database Field Name	Addtl_Loc		
Data Type	TEXT	Inclusion	Optional
Width	225	Domain	
Examples	Concourse B; Gate C14; Loading Dock 2B, Stairwell D		
Description	The type and identifier for a part of a sub address that is not a Building, Floor, Unit, Room, or Seat.		

4.3.12 Street Name Pre Modifier

Database Field Name	St_PreMod		
Data Type	TEXT	Inclusion	Conditional
Width	15	Domain	
Examples	**Old** North Highway 63		
Description	A word or phrase that precedes all other Street Name elements and is separated from the Street Name element by a Street Name Pre Directional and/or a Street Name Pre Type element. Not commonly used and use should be minimized.		

4.3.13 Street Name Pre Directional

Database Field Name	St_PreDir		
Data Type	TEXT	Inclusion	Conditional
Width	9	Domain	
Examples	**East** Main Street, Old **North** Highway 63		
Description	A word or phrase preceding the Street Name element that indicates the direction taken by the road from an arbitrary starting point or the sector where it is located.		

4.3.14 Street Name Pre Type

Database Field Name	St_PreTyp		
Data Type	TEXT	Inclusion	Conditional
Width	50	Domain	*NENA Street Name Pre Types and Street Name Post Types Registry [15]*
Examples	**Avenue** A, Old North **Highway** 63, **United States Highway** 40, **State Highway** 266, **Interstate** 70, **Route** K, **Highway** 124, **County Road** 443		
Description	A word or phrase that precedes the Street Name element and identifies the type of thoroughfare in the Full Street Name.		

4.3.15 Street Name Pre Type Separator

Database Field Name	St_PreSep		
Data Type	TEXT	Inclusion	Conditional
Width	20	Domain	*NENA Street Name Pre Type Separators Registry [16]*
Examples	Avenue **of the** Columns, Avenue **of** Champions		
Description	A preposition or prepositional phrase between the Street Name Pre Type and the Street Name element.		

4.3.16 Street Name

Database Field Name	St_Name		
Data Type	TEXT	Inclusion	Conditional
Width	60	Domain	
Examples	**Jones** Road, Highway **U**, Avenue of the **Columns**, Avenue **C**, **Azure** Court South		
Description	The official name of the road as defined by the official Street Naming Authority for the given jurisdiction. The Street Name element does not include a street type, directional, or modifier unless assigned as such by the official Street Naming Authority.		

4.3.17 Street Name Post Type

Database Field Name	St_PosTyp		
Data Type	TEXT	Inclusion	Conditional
Width	50	Domain	*NENA Street Name Pre Types and Street Name Post Types Registry [15]*
Examples	Jones **Road**, Azure **Court** South		
Description	A word or phrase that follows the Street Name element and identifies the type of thoroughfare in the Full Street Name.		

4.3.18 Street Name Post Directional

Database Field Name	St_PosDir		
Data Type	TEXT	Inclusion	Conditional
Width	9	Domain	
Examples	Azure Court **South**, 10th Avenue **West**		
Description	A word or phrase following the Street Name element that indicates the direction taken by the road from an arbitrary starting point or the sector where it is located.		

4.3.19 Street Name Post Modifier

Database Field Name	St_PosMod		
Data Type	TEXT	Inclusion	Conditional
Width	25	Domain	
Examples	Highway 63 **Connector,** Buttonwood Drive **Access**, Lake Road **Fire Road 8**, United States Highway 71 West **Frontage Road**, Interstate 70 **westbound**		
Description	A word or phrase that follows all other Street Name elements and is separated from the Street Name element by a Street Name Post Directional and/or Street Name Post Type element. Not commonly used and use should be minimized.		

4.3.20 Full Street Name

Database Field Name	FullStNm		
Data Type	TEXT	Inclusion	**Mandatory**
Width	245	Domain	
Examples	Old North County Highway 12, Azure Court South, Lake Road Fire Road 8		
Description	The Street Name with all Pre/Post Modifiers, Pre/Post Directionals, Pre Type Separator, and Pre/Post Types concatenated: St_PreMod + St_PreDir + St_PreTyp + St_PreSep + St_Name + St_PosTyp + St_PosDir + St_PosMod		

4.3.21 Legacy Full Street Name

Database Field Name	LgFullStNm		
Data Type	TEXT	Inclusion	Optional
Width	175	Domain	
Examples	OLD N HWY 63, AZURE CT S, LAKE RD FIRE RD 8		
Description	The Full Street Name with abbreviations (where appropriate) based on Legacy Street Name Pre Directional, Legacy Street Name, Legacy Street Name Type, and Legacy Street Name Post Directional		

4.3.22 Legacy Street Name Pre Directional

Database Field Name	LSt_PreDir		
Data Type	TEXT	Inclusion	Conditional
Width	2	Domain	
Examples	**E** MAIN ST, **S** ELMWOOD DR		
Description	The street direction prefix as it appears in the MSAG, as assigned by the official Street Naming Authority. Casing should reflect what appears in the MSAG data.		

4.3.23 Legacy Street Name

Database Field Name	LSt_Name		
Data Type	TEXT	Inclusion	Conditional
Width	75	Domain	
Examples	E **MAIN** ST, S **ELMWOOD** DR, **I 35**, **HWY U**, **10TH** AVE W, **AZURE** CT S		
Description	The street name field as it appears in the MSAG, as assigned by the official Street Naming Authority. Casing should reflect what appears in the MSAG data.		

4.3.24 Legacy Street Name Type

Database Field Name	LSt_Type		
Data Type	TEXT	Inclusion	Conditional
Width	4	Domain	USPS Publication 28, Appendix C1 [5]
Examples	E MAIN **ST**, S ELMWOOD **DR**, 10TH **AVE** W, AZURE **CT** S		
Description	The valid street type abbreviation as it appears in the MSAG, as assigned by the official Street Naming Authority. Casing should reflect what appears in the MSAG data.		

4.3.25 Legacy Street Name Post Directional

Database Field Name	LSt_PosDir		
Data Type	TEXT	Inclusion	Conditional
Width	2	Domain	
Examples	10TH AVE **W**, AZURE CT **S**		
Description	The street direction suffix as it appears in the MSAG, as assigned by the official Street Naming Authority. Casing should reflect what appears in the MSAG data.		

4.3.26 Postal Code

Database Field Name	Post_Code		
Data Type	TEXT	Inclusion	Optional
Width	7	Domain	USPS City State File Product [6]
Examples	64111, 63021		
Description	The 5-digit code that identifies the individual US Post Office or metropolitan area delivery station associated with an address.		

4.3.27 ZIP Plus 4

Database Field Name	Post_Code4		
Data Type	TEXT	Inclusion	Optional
Width	4	Domain	USPS City State File Product [6]
Examples	9675, 2871		
Description	A system of 4-digit codes that are used after the 5-digit Postal Code to specify a range of USPS delivery addresses.		

4.3.28 Postal Community Name

Database Field Name	Post_Comm		
Data Type	TEXT	Inclusion	Optional
Width	40	Domain	USPS City State File Product [6]
Examples	Branson, Hardin		
Description	The municipal name recognized by the USPS as valid for the ZIP Code of an address.		

4.4 Area Elements

4.4.1 Country

Database Field Name	Country		
Data Type	TEXT	Inclusion	**Mandatory**
Width	2	Domain	Restricted to the two-letter codes in ISO 3166-1 alpha-2 codes
Examples	US, CA		
Description	The two-letter abbreviation of the Country where the address is located. Must be in uppercase.		

4.4.2 State

Database Field Name	State		
Data Type	TEXT	Inclusion	**Mandatory**
Width	2	Domain	Restricted to the two-letter codes in ISO 3166-2
Examples	MO, AR, IL, IA, KS, KY, NE, OK, TN		
Description	The two-letter abbreviation of the State where the address is located. Must be in uppercase.		

4.4.3 County

Database Field Name	County		
Data Type	TEXT	Inclusion	**Mandatory**
Width	40	Domain	Restricted to the values in ANSI INCITS 31:2009, including casing and abbreviations [7] *MONG911CountyDomain*
Examples	Iron County, Knox County		
Description	The name of the County where the address is located.		

4.4.4 Incorporated Municipality

Database Field Name	Inc_Muni		
Data Type	TEXT	Inclusion	**Mandatory**
Width	100	Domain	
Examples	Stella, Warsaw, Loch Lloyd, Jefferson City, Kansas City, Unincorporated		
Description	The name of the Incorporated Municipality where the address is located, including the incorporated municipality type. If segments are in unincorporated areas, they should be populated with "UNINCORPORATED"		

4.4.5 Unincorporated Community

Database Field Name	Uninc_Comm		
Data Type	TEXT	Inclusion	Optional
Width	100	Domain	
Examples	Prathersville, Globe, Tebbetts		
Description	The name of the Unincorporated Community where the address is located.		

4.4.6 Neighborhood Community

Database Field Name	Nbrhd_Comm		
Data Type	TEXT	Inclusion	Optional
Width	100	Domain	
Examples	The Hill, Soulard, Forest Park		
Description	The name of an unincorporated neighborhood, subdivision, or area within an incorporated municipality where the address is located. Neighborhood communities are only used when they are known and have a clearly defined boundary.		

4.4.7 Additional Code

Database Field Name	AddCode		
Data Type	TEXT	Inclusion	Conditional
Width	6	Domain	
Examples			
Description	A Standard Geographical Classification code used in Canada that specifies a geographic area and is used to differentiate two municipalities with the same name in a province that does not have counties. **Note:** Since this field is not applicable in the US, it will not be populated in MO GIS data layers		

4.5 Functional Elements

4.5.1 Placement Method

Database Field Name	Placement		
Data Type	TEXT	Inclusion	Optional
Width	25	Domain	*NENA Site/Structure Address Point Placement Method Registry [17]*
Examples	Geocoding, Parcel, Property Access, Site, Structure, Unknown		
Description	The methodology used for placement of the address point.		

4.5.2 Place Type

Database Field Name	Place_Type		
Data Type	TEXT	Inclusion	Optional
Width	50	Domain	Restricted to the values in RFC 4589 [8]
Examples	Airport, bank, hotel, office, residence, stadium, store		
Description	The type of feature identified by the address.		

4.5.3 Additional Data URI

Database Field Name	AddDataURI		
Data Type	TEXT	Inclusion	Conditional
Width	254	Domain	
Examples	https://addtl12345.example.com		
Description	A Uniform Resource Identifier (URI) that defines the Service URI for accessing additional data and information associated with the address location, including building information (e.g., blueprints, contact info, floor plans).		

4.6 Management Elements

4.6.1 Date Updated

Database Field Name	DateUpdate		
Data Type	DATE	Inclusion	**Mandatory**
Width		Domain	
Examples	2020-01-28T15:47.09.3-06:00 (representing a record updated on January 28, 2020 at 3:47 and 9.3 seconds PM US Central Standard Time, with a precision of .1 second); 2020-07-16T08:31:15.2-05:00 (representing a record updated on July 16, 2020 at 8:31 and 15.2 seconds AM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record was created or last modified. If the record/feature was created or modified prior to implementing edit tracking, then any valid date prior to NG9-1-1 transition can be used.		

4.6.2 Effective Date

Database Field Name	Effective		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will become active on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will become active on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record is scheduled to take effect (e.g., the date and time an annexation takes effect and a copy of the Site/Structure Address Points within the annexed area that have had their Incorporated Municipality, ESN, and MSAG Community Name fields populated with the new values are recognized for use in the NG9 1 1 system).		

4.6.3 Expiration Date

Database Field Name	Expire		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will expire and no longer be valid on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will expire and no longer be valid on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time when the information in the record is no longer considered valid (e.g., the date and time an annexation takes effect and the Site/Structure Address Points within the annexed area that have their Incorporated Municipality, ESN, and MSAG Community Name fields populated with the former values are no longer recognized for use in the NG9-1-1 system).		

4.7 9-1-1 Elements

4.7.1 Discrepancy Agency ID

Database Field Name	DiscrpAgID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	75	Domain	
Examples	co.clay.mo.us, jacksoncounty.gov, countyofboone.com		
Description	The Agency Identifier (a registered domain name) for the agency that is responsible for receiving a Discrepancy Report and sufficiently resolving the discrepancy, should a discrepancy be discovered in the GIS data layer. This shall be the agency responsible for provisioning the GIS data layer to the Spatial Interface (SI) or to the SI Provider and may be the same agency as the locally appointed 9-1-1 Authority. If a PSAP does not have a registered domain name, the NG9-1-1 Core Service provider can provide assistance during transition.		

4.7.2 ESN

Database Field Name	ESN		
Data Type	TEXT	Inclusion	Conditional
Width	5	Domain	Characters from 000 to 99999
Examples	35, 810, 7115		
Description	A 3-5-character alphanumeric string that represents the Emergency Service Zone (ESZ) where the address is located.		

4.7.3 MSAG Community Name

Database Field Name	MSAGComm		
Data Type	TEXT	Inclusion	Conditional
Width	30	Domain	
Examples	Springfield, Liberty, Kansas City		
Description	The Community name where the address is located, as it appears in the MSAG. This may or may not be the same as the Postal Community Name used by the US Postal Service.		

4.7.4 Latitude

Database Field Name	Lat		
Data Type	FLOAT	Inclusion	Optional
Width		Domain	+90 degrees to -90 degrees
Examples	43.075450		
Description	The angular distance of the address point location north or south of the equator as defined by the coordinate system, expressed in decimal degrees. It is recommended to include 6 decimal places in the value.		

4.7.5 Longitude

Database Field Name	Long		
Data Type	FLOAT	Inclusion	Optional
Width		Domain	-180 degrees to +180 degrees
Examples	-89.385161		
Description	The angular distance of the address point location east or west of the prime meridian of the coordinate system, expressed in decimal degrees. It is recommended to include 6 decimal places in the value.		

4.7.6 Elevation

Database Field Name	Elev		
Data Type	LONG	Inclusion	Optional
Width	6	Domain	Whole numbers from 0 to 999999
Examples	68, 136		
Description	The WGS84 (GPS) elevation, given in meters above the ellipsoid, associated with the address.		

5 PSAP Boundary - Summary Table

This layer represents the geographic extent of each PSAP's primary call-taking responsibility. Some Mandatory attributes, such as Service URI, cannot be attributed until the ESInet has been established.

Chart Legend

Element Type	Description	Color
Identification Elements	Data elements required for feature level identification	
Relate Elements	Data elements used to relate features to other features	
Address Elements	Data elements required for addressing	
Area Elements	Data elements used for location identification	
Functional Elements	Data elements used for functionality in supported systems	
Management Elements	Data elements required for feature level management	
9-1-1 Elements	Data elements required to support 9-1-1	

Element Number	Element Name	Database Field Name	Field Type	Field Width	Inclusion	Domain	Reference Standard
5.1 Identification Elements							
5.1.1	Emergency Service Boundary NENA Globally Unique ID	ES_NGUID	TEXT	254	**Mandatory**		NENA
5.2 Relate Elements							
5.3 Address Elements							
5.4 Area Elements							
5.4.1	State	State	TEXT	2	**Mandatory**		US Census, NENA
5.5 Functional Elements							
5.5.1	Agency ID	Agency_ID	TEXT	100	**Mandatory**		NENA
5.5.2	Service URI	ServiceURI	TEXT	254	**Mandatory**		NENA
5.5.3	Service URN	ServiceURN	TEXT	50	**Mandatory**		NENA
5.5.4	Service Number	ServiceNum	TEXT	15	Optional		NENA
5.5.5	Agency vCard URI	AVcard_URI	TEXT	254	**Mandatory**		NENA
5.5.6	Display Name	DsplayName	TEXT	60	**Mandatory**		NENA
5.6 Management Elements							
5.6.1	Date Updated	DateUpdate	DATE		**Mandatory**		NENA
5.6.2	Effective Date	Effective	DATE		Optional		NENA
5.6.3	Expiration Date	Expire	DATE		Optional		NENA
5.7 9-1-1 Elements							
5.7.1	Discrepancy Agency ID	DiscrpAgID	TEXT	75	**Mandatory**		NENA

PSAP Boundary - Data Element Details

5.1 Identification Elements

5.1.1 Emergency Service Boundary NENA Globally Unique ID

Database Field Name	ES_NGUID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	254	Domain	
Examples	PSAP57311256@co.polk.mo.us, PSAP410371581@dentcounty.gov, PSAP45a133f2jm7f2g5n41b1hjpw18ay583t@countyofhenry.com		
Description	The NENA Globally Unique ID (NGUID) for a PSAP Boundary polygon such that when coalescing PSAP Boundary polygon data from other local 9-1-1 Authorities, this unique ID only occurs once. An Emergency Service Boundary NGUID is created by concatenating the locally assigned unique ID, the "@" symbol, and the Agency Identifier (a registered domain name). The locally assigned unique ID may be an autogenerated unique ID or a manually generated unique ID.		

5.2 Relate Elements

Not applicable.

5.3 Address Elements

Not applicable.

5.4 Area Elements

5.4.1 State

Database Field Name	State		
Data Type	TEXT	Inclusion	**Mandatory**
Width	2	Domain	Restricted to the two-letter codes in ISO 3166-2
Examples	MO, AR, IL, IA, KS, KY, NE, OK, TN		
Description	The two-letter abbreviation of the State where the address is located. Must be in uppercase.		

5.5 Functional Elements

5.5.1 Agency ID

Database Field Name	Agency_ID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	100	Domain	Must be a registered domain name
Examples	co.clay.mo.us, jacksoncounty.gov, countyofboone.com		
Description	A Domain Name System (DNS) registered domain name which is used to uniquely identify an agency. An agency is represented by a domain name as defined in Internet Engineering Task Force (IETF) RFC 1034 [2]. Each agency MUST use one domain name consistently in order to correlate actions across a wide range of calls and incidents. Any domain name in the public DNS is acceptable so long as each distinct agency uses a different domain name to ensure that each agency ID is globally unique.		

5.5.2 Service URI

Database Field Name	ServiceURI		
Data Type	TEXT	Inclusion	**Mandatory**
Width	254	Domain	Must be a registered domain name
Examples	sips:sos@psap.city.st.us; tel:+18165551212		
Description	The Uniform Resource Identifier (URI) used for call routing that defines the URI of the specific service. The URI is usually a Session Initiation Protocol (SIP or SIPs) URI but may be a telephone number (e.g., tel) URI that defines the route to reach the service. Internet Engineering Task Force (IETF) RFC 1035 [9] defines the process to register a domain name		

5.5.3 Service URN

Database Field Name	ServiceURN		
Data Type	TEXT	Inclusion	**Mandatory**
Width	50	Domain	*NENA urn:service:sos Registry*
Examples	urn:service:sos.psap; urn:service:responder.police; urn:service:responder.fire; urn:service:responder.ems		
Description	The Uniform Resource Name (URN) used to select the service for which a route is desired. The ECRF is queried with a location and a service URN, and then returns the service URI.		

5.5.4 Service Number

Database Field Name	ServiceNum		
Data Type	TEXT	Inclusion	Optional
Width	15	Domain	A dialable number or dial string
Examples	911, 18002221212		
Description	The numbers that would be dialed on a 12-digit keypad to reach the emergency service appropriate for the location. This is not the same as an Emergency Service Number (ESN) in Legacy E9-1-1 systems. This field is used for all Emergency Boundaries including PSAP; Law; Fire; EMS; and others such as Poison Control. Within the United States the Service Number for most emergency services is 9-1-1, however, there may be Emergency Service boundaries that have a different number that may be associated with them such as Poison Control.		

5.5.5 Agency vCard URI

Database Field Name	AVcard_URI		
Data Type	TEXT	Inclusion	**Mandatory**
Width	254	Domain	
Examples	https://vcard.psap.city.st.us; https://vcard.jurisdiction.gov/fire		
Description	A vCard (virtual card) is a file format standard for electronic business cards. The Agency vCard URI is the internet address of an eXtensible Markup Language (XML) data structure that contains contact information (e.g., agency name, contact phone numbers) in the form of a vCard (RFC 6350 [10]). vCard files may be exported from most email programs or created with a text editor. The vCard URI is used in the service boundary layers to provide contact information for each agency. The Service/Agency Locator (see NENA STA-010.2-2016 [11]) will provide these URIs for agencies listed within it.		

5.5.6 Display Name

Database Field Name	DsplayName		
Data Type	TEXT	Inclusion	**Mandatory**
Width	60	Domain	
Examples	Columbia Fire Department		
Description	A name or description of the entity offering emergency services within a PSAP or Emergency Service Boundary. This value must be suitable for display.		

5.6 Management Elements

5.6.1 Date Updated

Database Field Name	DateUpdate		
Data Type	DATE	Inclusion	**Mandatory**
Width		Domain	
Examples	2020-01-28T15:47.09.3-06:00 (representing a record updated on January 28, 2020 at 3:47 and 9.3 seconds PM US Central Standard Time, with a precision of .1 second); 2020-07-16T08:31:15.2-05:00 (representing a record updated on July 16, 2020 at 8:31 and 15.2 seconds AM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record was created or last modified. If the record/feature was created or modified prior to implementing edit tracking, then any valid date prior to NG9-1-1 transition can be used.		

5.6.2 Effective Date

Database Field Name	Effective		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will become active on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will become active on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record is scheduled to take effect (e.g., the date and time an annexation takes effect and the new PSAP Boundary is recognized for use in the NG9-1-1 system).		

5.6.3 Expiration Date

Database Field Name	Expire		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will expire and no longer be valid on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will expire and no longer be valid on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time when the information in the record is no longer considered valid (e.g., the date and time an annexation takes effect and the former PSAP Boundary is no longer recognized for use in the NG9-1-1 system).		

5.7 9-1-1 Elements

5.7.1 Discrepancy Agency ID

Database Field Name	DiscrpAgID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	75	Domain	
Examples	co.clay.mo.us, jacksoncounty.gov, countyofboone.com		
Description	The Agency Identifier (a registered domain name) for the agency that is responsible for receiving a Discrepancy Report and sufficiently resolving the discrepancy, should a discrepancy be discovered in the GIS data layer. This shall be the agency responsible for provisioning the GIS data layer to the Spatial Interface (SI) or to the SI Provider and may be the same agency as the locally appointed 9-1-1 Authority. If a PSAP does not have a registered domain name, the NG9-1-1 Core Service provider can provide assistance during transition.		

6 Emergency Service Boundary - Summary Table

This layer represents the geographic area for the primary responders of emergency response services. There must be an individual Emergency Service Boundary layer for each type of service. At a minimum, there must be a separate layer for Law Enforcement, Fire, and Emergency Medical Services. Other Emergency Service Boundaries such as Poison Control, Forest Service, Coast Guard, etc., may also be created, each following this same data structure but in their own separate layer. Note that the Emergency Service Boundary layer may be maintained locally either as a combined layer or as separate layers for each emergency service. However, when providing data for NG9-1-1, the Emergency Service Boundary must be provided as separate layers for each emergency service. Some Mandatory attributes, such as Service URI, cannot be attributed until the ESInet has been established.

Chart Legend

Element Type	Description	Color
Identification Elements	Data elements required for feature level identification	
Relate Elements	Data elements used to relate features to other features	
Address Elements	Data elements required for addressing	
Area Elements	Data elements used for location identification	
Functional Elements	Data elements used for functionality in supported systems	
Management Elements	Data elements required for feature level management	
9-1-1 Elements	Data elements required to support 9-1-1	

Element Number	Element Name	Database Field Name	Field Type	Field Width	Inclusion	Domain	Reference Standard
6.1 Identification Elements							
6.1.1	Emergency Service Boundary NENA Globally Unique ID	ES_NGUID	TEXT	254	**Mandatory**		NENA
6.2 Relate Elements							
6.3 Address Elements							
6.4 Area Elements							
6.4.1	State	State	TEXT	2	**Mandatory**		US Census, NENA
6.5 Functional Elements							
6.5.1	Agency ID	Agency_ID	TEXT	100	**Mandatory**		NENA
6.5.2	Service URI	ServiceURI	TEXT	254	**Mandatory**		NENA
6.5.3	Service URN	ServiceURN	TEXT	50	**Mandatory**	NENA *urn:nena:service:sos Registry*	NENA
6.5.4	Service Number	ServiceNum	TEXT	15	Optional		NENA
6.5.5	Agency vCard URI	AVcard_URI	TEXT	254	**Mandatory**		NENA
6.5.6	Display Name	DsplayName	TEXT	60	**Mandatory**		NENA
6.6 Management Elements							
6.6.1	Date Updated	DateUpdate	DATE		**Mandatory**		NENA
6.6.2	Effective Date	Effective	DATE		Optional		NENA
6.6.3	Expiration Date	Expire	DATE		Optional		NENA
6.7 9-1-1 Elements6.7 9-1-1 Elements							
6.7.16.7.1	Discrepancy Agency ID	DiscrpAgID	TEXT	75	**Mandatory**		NENA

Emergency Service Boundary - Data Element Details

6.1 Identification Elements

6.1.1 Emergency Service Boundary NENA Globally Unique ID

Database Field Name	ES_NGUID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	254	Domain	
Examples	LAW71378233@co.polk.mo.us, LAW617271786@dentcounty.gov, LAW54a513f2kk7g5h7n41b0hxwa81jw531c@countyofhenry.com		
Description	The NENA Globally Unique ID (NGUID) for an ESB Boundary polygon such that when coalescing ESB Boundary polygon data from other local 9-1-1 Authorities, this unique ID only occurs once. An Emergency Service Boundary NGUID is created by concatenating the locally assigned unique ID, the "@" symbol, and the Agency Identifier (a registered domain name). The locally assigned unique ID may be an autogenerated unique ID or a manually generated unique ID.		

6.2 Relate Elements

Not applicable.

6.3 Address Elements

Not applicable.

6.4 Area Elements

6.4.1 State

Database Field Name	State		
Data Type	TEXT	Inclusion	**Mandatory**
Width	2	Domain	Restricted to the two-letter codes in ISO 3166-2
Examples	MO, AR, IL, IA, KS, KY, NE, OK, TN		
Description	The two-letter abbreviation of the State where the address is located. Must be in uppercase.		

6.5 Functional Elements

6.5.1 Agency ID

Database Field Name	Agency_ID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	100	Domain	Must be a registered domain name
Examples	co.clay.mo.us, jacksoncounty.gov, countyofboone.com		
Description	A Domain Name System (DNS) registered domain name which is used to uniquely identify an agency. An agency is represented by a domain name as defined in Internet Engineering Task Force (IETF) RFC 1034 [2]. Each agency MUST use one domain name consistently in order to correlate actions across a wide range of calls and incidents. Any domain name in the public DNS is acceptable so long as each distinct agency uses a different domain name to ensure that each agency ID is globally unique.		

6.5.2 Service URI

Database Field Name	ServiceURI		
Data Type	TEXT	Inclusion	**Mandatory**
Width	254	Domain	Must be a registered domain name
Examples	sips:sos@fire.city.st.us; tel:+18165551212		
Description	The Uniform Resource Identifier (URI) used for call routing that defines the URI of the specific service. The URI is usually a Session Initiation Protocol (SIP or SIPs) URI but may be a telephone number (e.g., tel) URI that defines the route to reach the service. Internet Engineering Task Force (IETF) RFC 1035 [9] defines the process to register a domain name		

6.5.3 Service URN

Database Field Name	ServiceURN		
Data Type	TEXT	Inclusion	**Mandatory**
Width	50	Domain	*NENA urn:service:sos Registry*
Examples	urn:service:responder.police; urn:service:responder.fire; urn:service:responder.ems		
Description	The Uniform Resource Name (URN) used to select the service for which a route is desired. The ECRF is queried with a location and a service URN, and then returns the service URI.		

6.5.4 Service Number

Database Field Name	ServiceNum		
Data Type	TEXT	Inclusion	Optional
Width	15	Domain	A dialable number or dial string
Examples	911, 18002221212		
Description	The numbers that would be dialed on a 12-digit keypad to reach the emergency service appropriate for the location. This is not the same as an Emergency Service Number (ESN) in Legacy E9-1-1 systems. This field is used for all Emergency Boundaries including PSAP; Law; Fire; EMS; and others such as Poison Control. Within the United States the Service Number for most emergency services is 9-1-1, however, there may be Emergency Service boundaries that have a different number that may be associated with them such as Poison Control.		

6.5.5 Agency vCard URI

Database Field Name	AVcard_URI		
Data Type	TEXT	Inclusion	**Mandatory**
Width	254	Domain	
Examples	https://vcard.psap.city.st.us; https://vcard.jurisdiction.gov/fire		
Description	A vCard (virtual card) is a file format standard for electronic business cards. The Agency vCard URI is the internet address of an eXtensible Markup Language (XML) data structure that contains contact information (e.g., agency name, contact phone numbers) in the form of a vCard (RFC 6350 [10]). vCard files may be exported from most email programs or created with a text editor. The vCard URI is used in the service boundary layers to provide contact information for each agency. The Service/Agency Locator (see NENA STA-010.2-2016 [11]) will provide these URIs for agencies listed within it.		

6.5.6 Display Name

Database Field Name	DsplayName		
Data Type	TEXT	Inclusion	**Mandatory**
Width	60	Domain	
Examples	Columbia Fire Department		
Description	A name or description of the entity offering emergency services within a PSAP or Emergency Service Boundary. This value must be suitable for display.		

6.6 Management Elements

6.6.1 Date Updated

Database Field Name	DateUpdate		
Data Type	DATE	Inclusion	**Mandatory**
Width		Domain	
Examples	2020-01-28T15:47.09.3-06:00 (representing a record updated on January 28, 2020 at 3:47 and 9.3 seconds PM US Central Standard Time, with a precision of .1 second); 2020-07-16T08:31:15.2-05:00 (representing a record updated on July 16, 2020 at 8:31 and 15.2 seconds AM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record was created or last modified. If the record/feature was created or modified prior to implementing edit tracking, then any valid date prior to NG9-1-1 transition can be used.		

6.6.2 Effective Date

Database Field Name	Effective		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will become active on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will become active on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record is scheduled to take effect (e.g., the date and time an annexation takes effect, and the new Emergency Service Boundary is recognized for use in the NG9-1-1 system).		

6.6.3 Expiration Date

Database Field Name	Expire		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will expire and no longer be valid on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will expire and no longer be valid on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time when the information in the record is no longer considered valid (e.g., the date and time an annexation takes effect and the former Emergency Service Boundary is no longer recognized for use in the NG9-1-1 system).		

6.7 9-1-1 Elements

6.7.1 Discrepancy Agency ID

Database Field Name	DiscrpAgID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	75	Domain	
Examples	co.clay.mo.us, jacksoncounty.gov, countyofboone.com		
Description	The Agency Identifier (a registered domain name) for the agency that is responsible for receiving a Discrepancy Report and sufficiently resolving the discrepancy, should a discrepancy be discovered in the GIS data layer. This shall be the agency responsible for provisioning the GIS data layer to the Spatial Interface (SI) or to the SI Provider and may be the same agency as the locally appointed 9-1-1 Authority. If a PSAP does not have a registered domain name, the NG9-1-1 Core Service provider can provide assistance during transition.		

7 Provisioning Boundary - Summary Table

This layer represents the coverage area for which GIS data providers are responsible for submitting GIS data for NG9-1-1. The data provided must cover the entire extent of the coverage area that defines their geographic area of responsibility, but data must not extend beyond the identified coverage area.

Chart Legend

Element Type	Description	Color
Identification Elements	Data elements required for feature level identification	
Relate Elements	Data elements used to relate features to other features	
Address Elements	Data elements required for addressing	
Area Elements	Data elements used for location identification	
Functional Elements	Data elements used for functionality in supported systems	
Management Elements	Data elements required for feature level management	
9-1-1 Elements	Data elements required to support 9-1-1	

Element Number	Element Name	Database Field Name	Field Type	Field Width	Inclusion	Domain	Reference Standard
7.1 Identification Elements							
7.1.1	Provisioning Boundary NENA Globally Unique ID	PB_NGUID	TEXT	254	**Mandatory**		NENA
7.2 Relate Elements							
7.3 Address Elements							
7.4 Area Elements							
7.5 Functional Elements							
7.6 Management Elements							
7.6.1	Date Updated	DateUpdate	DATE		**Mandatory**		NENA
7.6.2	Effective Date	Effective	DATE		Optional		NENA
7.6.3	Expiration Date	Expire	DATE		Optional		NENA
7.7 9-1-1 Elements7.7 9-1-1 Elements							
7.7.1	Discrepancy Agency ID	DiscrpAgID	TEXT	75	**Mandatory**		NENA

Provisioning Boundary - Data Element Details

7.1 Identification Elements

7.1.1 Provisioning Boundary NENA Globally Unique ID

Database Field Name	PB_NGUID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	254	Domain	
Examples	PB16424289@co.polk.mo.us, PB210252128@dentcounty.gov, PB65e160f2ad7f2g1w55k1hjwa74ap891v@countyofhenry.com		
Description	The NENA Globally Unique ID (NGUID) for a Provisioning Boundary such that when coalescing Provisioning Boundary polygon data from other local 9-1-1 Authorities, this unique ID only occurs once. A Provisioning Boundary NGUID is created by concatenating the locally assigned unique ID, the "@" symbol, and the Agency Identifier (a registered domain name). The locally assigned unique ID may be an autogenerated unique ID or a manually generated unique ID.		

7.2 Relate Elements

Not applicable.

7.3 Address Elements

Not applicable.

7.4 Area Elements

Not applicable.

7.5 Functional Elements

Not applicable.

7.6 Management Elements

7.6.1 Date Updated

Database Field Name	DateUpdate		
Data Type	DATE	Inclusion	**Mandatory**
Width		Domain	
Examples	2020-01-28T15:47.09.3-06:00 (representing a record updated on January 28, 2020 at 3:47 and 9.3 seconds PM US Central Standard Time, with a precision of .1 second); 2020-07-16T08:31:15.2-05:00 (representing a record updated on July 16, 2020 at 8:31 and 15.2 seconds AM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record was created or last modified. If the record/feature was created or modified prior to implementing edit tracking, then any valid date prior to NG9-1-1 transition can be used.		

7.6.2 Effective Date

Database Field Name	Effective		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will become active on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will become active on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record is scheduled to take effect (e.g., the date and time an annexation takes effect and the new Provisioning Boundary is recognized for use in the NG9-1-1 system).		

7.6.3 Expiration Date

Database Field Name	Expire		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will expire and no longer be valid on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will expire and no longer be valid on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time when the information in the record is no longer considered valid (e.g., the date and time an annexation takes effect and the former Provisioning Boundary is no longer recognized for use in the NG9-1-1 system).		

7.7 9-1-1 Elements

7.7.1 Discrepancy Agency ID

Database Field Name	DiscrpAgID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	75	Domain	
Examples	co.clay.mo.us, jacksoncounty.gov, countyofboone.com		
Description	The Agency Identifier (a registered domain name) for the agency that is responsible for receiving a Discrepancy Report and sufficiently resolving the discrepancy, should a discrepancy be discovered in the GIS data layer. This shall be the agency responsible for provisioning the GIS data layer to the Spatial Interface (SI) or to the SI Provider and may be the same agency as the locally appointed 9-1-1 Authority. If a PSAP does not have a registered domain name, the NG9-1-1 Core Service provider can provide assistance during transition.		

8 Incorporated Municipality Boundary - Summary Table

This layer defines the boundaries of cities, towns, villages, boroughs, or similar entities that have local governmental powers and may be useful in determining jurisdictional authority for addressing and emergency response.

Chart Legend

Element Type	Description	Color
Identification Elements	Data elements required for feature level identification	
Relate Elements	Data elements used to relate features to other features	
Address Elements	Data elements required for addressing	
Area Elements	Data elements used for location identification	
Functional Elements	Data elements used for functionality in supported systems	
Management Elements	Data elements required for feature level management	
9-1-1 Elements	Data elements required to support 9-1-1	

Element Number	Element Name	Database Field Name	Field Type	Field Width	Inclusion	Domain	Reference Standard
7.1 Identification Elements							
7.1.1	Incorporated Municipality NENA Globally Unique ID	IncM_NGUID	TEXT	254	**Mandatory**		NENA
7.2 Relate Elements							
7.3 Address Elements							
7.4 Area Elements							
8.4.1	Country	Country	TEXT	2	**Mandatory**		NENA
8.4.2	State	State	TEXT	2	**Mandatory**		US Census, NENA
8.4.3	County	County	TEXT	40	**Mandatory**	*MONG911CountyDomain*	US Census, NENA
8.4.4	Incorporated Municipality	Inc_Muni	TEXT	100	**Mandatory**		US Census, NENA
8.4.5	Additional Code	AddCode	TEXT	6	Conditional		NENA
7.5 Functional Elements							
7.6 Management Elements							
7.6.1	Date Updated	DateUpdate	DATE		**Mandatory**		NENA
7.6.2	Effective Date	Effective	DATE		Optional		NENA
7.6.3	Expiration Date	Expire	DATE		Optional		NENA
7.7 9-1-1 Elements							
7.7.1	Discrepancy Agency ID	DiscrpAgID	TEXT	75	**Mandatory**		NENA

Incorporated Municipality Boundary - Data Element Details

8.1 Identification Elements

8.1.1 Incorporated Municipality Boundary NENA Globally Unique ID

Database Field Name	IncM_NGUID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	254	Domain	
Examples	MUNI16424289@co.polk.mo.us, MUNI210252128@dentcounty.gov, MUNI65e160f2ad7f2g1w55k1hjwa74ap891v@countyofhenry.com		
Description	The NENA Globally Unique ID (NGUID) for an Incorporated Municipality Boundary such that when coalescing Incorporated Municipality Boundary polygon data from other local 9-1-1 Authorities, this unique ID only occurs once. An Incorporated Municipality Boundary NGUID is created by concatenating the locally assigned unique ID, the "@" symbol, and the Agency Identifier (a registered domain name). The locally assigned unique ID may be an autogenerated unique ID or a manually generated unique ID.		

8.2 Relate Elements

Not applicable.

8.3 Address Elements

Not applicable.

8.4 Area Elements

8.4.1 Country

Database Field Name	Country		
Data Type	TEXT	Inclusion	**Mandatory**
Width	2	Domain	Restricted to the two-letter codes in ISO 3166-1 alpha-2 codes
Examples	US, CA		
Description	The two-letter abbreviation of the Country where the address is located. Must be in uppercase.		

8.4.2 State

Database Field Name	State		
Data Type	TEXT	Inclusion	**Mandatory**
Width	2	Domain	Restricted to the two-letter codes in ISO 3166-2
Examples	MO, AR, IL, IA, KS, KY, NE, OK, TN		
Description	The two-letter abbreviation of the State where the address is located. Must be in uppercase.		

8.4.3 County

Database Field Name	County		
Data Type	TEXT	Inclusion	**Mandatory**
Width	40	Domain	Restricted to the values in ANSI INCITS 31:2009, including casing and abbreviations [7] *MONG911CountyDomain*
Examples	Iron County, Knox County		
Description	The name of the County where the address is located.		

8.4.4 Incorporated Municipality

Database Field Name	Inc_Muni		
Data Type	TEXT	Inclusion	**Mandatory**
Width	100	Domain	
Examples	Stella, Warsaw, Loch Lloyd, Jefferson City, Kansas City		
Description	The name of the Incorporated Municipality where the address is located, including the incorporated municipality type.		

8.4.5 Additional Code

Database Field Name	AddCode		
Data Type	TEXT	Inclusion	Conditional
Width	6	Domain	
Examples			
Description	A Standard Geographical Classification code used in Canada that specifies a geographic area and is used to differentiate two municipalities with the same name in a province that does not have counties. **Note:** Since this field is not applicable in the US, it will not be populated in MO GIS data layers		

8.5 Functional Elements

Not applicable.

8.6 Management Elements

8.6.1 Date Updated

Database Field Name	DateUpdate		
Data Type	DATE	Inclusion	**Mandatory**
Width		Domain	
Examples	2020-01-28T15:47.09.3-06:00 (representing a record updated on January 28, 2020 at 3:47 and 9.3 seconds PM US Central Standard Time, with a precision of .1 second); 2020-07-16T08:31:15.2-05:00 (representing a record updated on July 16, 2020 at 8:31 and 15.2 seconds AM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record was created or last modified. If the record/feature was created or modified prior to implementing edit tracking, then any valid date prior to NG9-1-1 transition can be used.		

8.6.2 Effective Date

Database Field Name	Effective		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will become active on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will become active on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record is scheduled to take effect (e.g., the date and time an annexation takes effect, and the new Provisioning Boundary is recognized for use in the NG9-1-1 system).		

8.6.3 Expiration Date

Database Field Name	Expire		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will expire and no longer be valid on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will expire and no longer be valid on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time when the information in the record is no longer considered valid (e.g., the date and time an annexation takes effect and the former Provisioning Boundary is no longer recognized for use in the NG9-1-1 system).		

8.7 9-1-1 Elements

8.7.1 Discrepancy Agency ID

Database Field Name	DiscrpAgID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	75	Domain	
Examples	co.clay.mo.us, jacksoncounty.gov, countyofboone.com		
Description	The Agency Identifier (a registered domain name) for the agency that is responsible for receiving a Discrepancy Report and sufficiently resolving the discrepancy, should a discrepancy be discovered in the GIS data layer. This shall be the agency responsible for provisioning the GIS data layer to the Spatial Interface (SI) or to the SI Provider and may be the same agency as the locally appointed 9-1-1 Authority. If a PSAP does not have a registered domain name, the NG9-1-1 Core Service provider can provide assistance during transition.		

9 County Boundary - Summary Table

This layer represents counties or their equivalent boundary as the primary legal division of a state, province, or territory.

Chart Legend

Element Type	Description	Color
Identification Elements	Data elements required for feature level identification	
Relate Elements	Data elements used to relate features to other features	
Address Elements	Data elements required for addressing	
Area Elements	Data elements used for location identification	
Functional Elements	Data elements used for functionality in supported systems	
Management Elements	Data elements required for feature level management	
9-1-1 Elements	Data elements required to support 9-1-1	

Element Number	Element Name	Database Field Name	Field Type	Field Width	Inclusion	Domain	Reference Standard
9.1 Identification Elements							
9.1.1	County NENA Globally Unique ID	Cnty_NGUID	TEXT	254	**Mandatory**		NENA
9.2 Relate Elements							
9.3 Address Elements							
9.4 Area Elements							
9.4.1	Country	Country	TEXT	2	**Mandatory**		NENA
9.4.2	State	State	TEXT	2	**Mandatory**		US Census, NENA
9.4.3	County	County	TEXT	40	**Mandatory**	*MONG911CountyDomain*	US Census, NENA
9.5 Functional Elements							
9.6 Management Elements							
9.6.1	Date Updated	DateUpdate	DATE		**Mandatory**		NENA
9.6.2	Effective Date	Effective	DATE		Optional		NENA
9.6.3	Expiration Date	Expire	DATE		Optional		NENA
9.7 9-1-1 Elements							
9.7.1	Discrepancy Agency ID	DiscrpAgID	TEXT	75	**Mandatory**		NENA

County Boundary - Data Element Details

9.1 Identification Elements

9.1.1 County Boundary NENA Globally Unique ID

Database Field Name	Cnty_NGUID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	254	Domain	
Examples	CB16424289@co.polk.mo.us, CB210252128@dentcounty.gov, CB65e160f2ad7f2g1w55k1hjwa74ap891v@countyofhenry.com		
Description	The NENA Globally Unique ID (NGUID) for a County Boundary such that when coalescing County Boundary polygon data from other local 9-1-1 Authorities, this unique ID only occurs once. A County Boundary NGUID is created by concatenating the locally assigned unique ID, the "@" symbol, and the Agency Identifier (a registered domain name). The locally assigned unique ID may be an autogenerated unique ID or a manually generated unique ID.		

9.2 Relate Elements

Not applicable.

9.3 Address Elements

Not applicable.

9.4 Area Elements

9.4.1 Country

Database Field Name	Country		
Data Type	TEXT	Inclusion	**Mandatory**
Width	2	Domain	Restricted to the two-letter codes in ISO 3166-1 alpha-2 codes
Examples	US, CA		
Description	The two-letter abbreviation of the Country where the address is located. Must be in uppercase.		

9.4.2 State

Database Field Name	State		
Data Type	TEXT	Inclusion	**Mandatory**
Width	2	Domain	Restricted to the two-letter codes in ISO 3166-2
Examples	MO, AR, IL, IA, KS, KY, NE, OK, TN		
Description	The two-letter abbreviation of the State where the address is located. Must be in uppercase.		

9.4.3 County

Database Field Name	County		
Data Type	TEXT	Inclusion	**Mandatory**
Width	40	Domain	Restricted to the values in ANSI INCITS 31:2009, including casing and abbreviations [7] *MONG911CountyDomain*
Examples	Iron County, Knox County		
Description	The name of the County where the address is located.		

9.5 Functional Elements

Not applicable.

9.6 Management Elements

9.6.1 Date Updated

Database Field Name	DateUpdate		
Data Type	DATE	Inclusion	**Mandatory**
Width		Domain	
Examples	2020-01-28T15:47.09.3-06:00 (representing a record updated on January 28, 2020 at 3:47 and 9.3 seconds PM US Central Standard Time, with a precision of .1 second); 2020-07-16T08:31:15.2-05:00 (representing a record updated on July 16, 2020 at 8:31 and 15.2 seconds AM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record was created or last modified. If the record/feature was created or modified prior to implementing edit tracking, then any valid date prior to NG9-1-1 transition can be used.		

9.6.2 Effective Date

Database Field Name	Effective		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will become active on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will become active on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time that the record is scheduled to take effect (e.g., the date and time an annexation takes effect and the new Provisioning Boundary is recognized for use in the NG9-1-1 system).		

9.6.3 Expiration Date

Database Field Name	Expire		
Data Type	DATE	Inclusion	Optional
Width		Domain	
Examples	2021-02-11T01:30:00.1-06:00 (representing a record that will expire and no longer be valid on February 11, 2021 at 1:30 and 0.1 seconds AM US Central Standard Time, with a precision of .1 second); 2021-10-15T20:15:30.5-05:00 (representing a record that will expire and no longer be valid on October 15, 2021 at 8:15 and 30.5 seconds PM US Central Daylight Time, with a precision of .1 second)		
Description	The date and time when the information in the record is no longer considered valid (e.g., the date and time an annexation takes effect and the former Provisioning Boundary is no longer recognized for use in the NG9-1-1 system).		

9.7 9-1-1 Elements

9.7.1 Discrepancy Agency ID

Database Field Name	DiscrpAgID		
Data Type	TEXT	Inclusion	**Mandatory**
Width	75	Domain	
Examples	co.clay.mo.us, jacksoncounty.gov, countyofboone.com		
Description	The Agency Identifier (a registered domain name) for the agency that is responsible for receiving a Discrepancy Report and sufficiently resolving the discrepancy, should a discrepancy be discovered in the GIS data layer. This shall be the agency responsible for provisioning the GIS data layer to the Spatial Interface (SI) or to the SI Provider and may be the same agency as the locally appointed 9-1-1 Authority. If a PSAP does not have a registered domain name, the NG9-1-1 Core Service provider can provide assistance during transition.		

10 Potential Future Changes in NENA Standards Impacting this Standard

NENA NG9-1-1 Standards undergo continuous review and update, particularly as the implementation of the NENA Standards often identifies areas needing improvement, clarification, or reconsideration. It is important for the State of Missouri to monitor the development of NENA NG9-1-1 GIS standards and how elements in this standard may be impacted by potential future changes in the NENA Standards. The NENA NG9-1-1 Civic Location Data Exchange Format (CLDXF) Standard [12] and the NENA Standard for NG9-1-1 GIS Data Model [1] are both undergoing an update as of the release of this document. Noted below are planned changes in these documents that may impact the Missouri NG9-1-1 GIS Data Standard.

New elements planned to be added in version 2 of the NENA CLDXF Standard, which will eventually result in equivalent additions to the NENA NG9-1-1 GIS Data Model Standard:

- Site — The name of an exterior area which is publicly known and unique within a given place. A site may contain one or more structures and/or sub-sites.
- Subsite — The name of a sub-area within a larger area specified either by site name, by a thoroughfare address, or both.
- Structure — A built feature which has a vertical dimension, including conventional buildings which have walls, doors, and a roof, as well as other kinds of infrastructure such as cell towers, transformer stations, fuel tanks, and so on.
- Unit Pre Type — Part of the complete unit identifier that precedes the Unit Value and indicates the kind of unit.

- Unit Value — Part of the complete unit identifier that uniquely identifies a particular unit.
- Wing — A designated part of a structure which spans one or many floors, typically including more than one unit or room and representing a significant portion of the structure floor area.
- Section — An identified, unenclosed area within a structure, wing, unit, or room.
- Row — An identified linear feature, such as a linear arrangement of seats, workstations, equipment, or storage, within a structure, wing, unit or room.

Existing elements planned for removal and replacement with new element(s) in version two of the NENA CLDXF Standard, which will eventually result in equivalent changes to the NENA NG9-1-1 GIS Data Model Standard, currently include:

- Complete Landmark Name – to be replaced by new Site, Subsite, and Structure elements
- Building – to be replaced by new Structure element
- Unit – to be replaced with new Unit PreType and Unit Value elements

11 Considerations for GIS Data Development and Maintenance

11.1 General Considerations

Not all attribute fields are required for the ECRF and LVF to function. Having a strategy to populate these optional fields over time will help keep costs in check while making the best use of available resources. A good data development and maintenance plan should be created at the earliest stages to ensure the best use of available resources. Considerations when developing such a plan are discussed throughout Section 11.

11.1.1 Metadata

Metadata is information about the dataset that explains the who, what, where, when, why, and how. This information is important when sharing data with others so that the recipient clearly understands what the data contains and who to contact if there are additional questions. Minimum metadata to consider providing include:

- Identification information (abstract, purpose for creating)
- Date updated (date when changes were last made to the data)
- Point of Contact (person, position, organization, contact information)
- Reference system information (datum, coordinate system, projection)

11.1.2 Use of Orthoimagery versus Field Collection

The availability of current, high resolution orthoimagery can provide a cost-effective way to create spatially accurate address points, add new road centerlines, or compile changes in existing road centerlines. Road centerline compilation and address point placement performed in the office is more efficient than sending staff into the field to collect geospatial coordinates for addressed locations and road alignments that clearly exist in orthoimagery. Consider limiting field collection to:

- Subaddresses
- Sites, structures, and new roads not yet present in the existing imagery
- Sites, structures, and road centerlines that are not clearly discernible in the existing imagery

The aerial imagery for Missouri is hosted at the State GIS Clearinghouse - MSDIS (missouri.edu). The last state-wide flight was 2015-2016. Urban areas are typically flown more frequently. While orthoimagery may provide an excellent resource for mapping existing features, updated imagery is useful to capture new roads and addressed features.

11.2 Considerations for Road Centerlines

11.2.1 Accuracy of Boundary Data (for alignment/segmentation at boundaries)

Boundary data is essential for accurate NG9-1-1 systems. Overlapping boundaries can create issues when segmenting data. This is especially important when aligning Road Centerlines with state and county boundaries. When aligning and segmenting Road Centerlines with any boundary, the local jurisdiction should always check with the entity responsible for maintaining that boundary alignment to ensure the correct boundary is being used.

11.2.2 Limitations of CAD Software

Each CAD software has its own requirements when dealing with road centerline data. Some CAD systems may require 0-0 ranges, while others may not. Some CAD software may also allow for Z (height) values which will affect how road centerlines are split at over/underpasses. Currently, not all CAD software programs can natively consume GIS data in NENA's NG9-1-1 GIS Data Model [1] format (upon which the Missouri NG9-1-1 GIS Data Standard is based) and may require the use of abbreviations or different parsing of the street names and addresses. These best practices do not consider each CAD software vendor's solutions, and therefore the data developer should always refer to CAD software requirements when updating Road Centerlines.

11.3 Considerations for Site/Structure Address Points

Organizations developing Site/Structure Address Points need to carefully consider the level of positional accuracy desired and the resources available, not just for initial data development but long-term data maintenance. In general, address point placement methodologies that result in more spatially accurate points require more resources to create and maintain them.

11.3.1 Placement Method (e.g., Structure, Site, Property Access, Parcel, Geocoding)

Some address point placement methodologies require minimal resources while others are resource intensive. Consider starting with a less spatial accurate placement method and over time gradually improve the spatially accuracy of the address points as resources allow. For example, use available parcel data to generate address points from parcel centroids and then, as resources permit, use orthoimagery to move the address points onto the sites and structures. This allows for quick creation of a Site/Structure Address Point layer that can be used immediately in 9-1-1 applications. Temporary address points can be created using the parcel centroid or property access in cases where a structure cannot be discerned in the orthoimagery until field collection of the structure can be made. Population of the Placement Method attribute is recommended in these situations to provide data users with information on the address point's positional accuracy.

11.3.2 Available Resources for Development

The initial development of site/structure address points can be a daunting initiative. As a starting point, the University of Missouri collected structure footprints and points by county between 2011 and 2014 [18]. The project only collected features for structures visually identified in the current imagery at the time and did not collect addresses. While the GIS data is not complete, it is a great resource for counties without any current site/structure address points. There is also a series of Map Atlas documents per county that include an index of road names per map book [19].

Additionally, the Fire Safety Inspection Program, the Office of the State Fire Marshal collects geographic locations and civic addresses for all sites they license. For more information on available resources contact the Fire Safety Inspection Program.

11.3.3 Amount of Subaddress Detail Needed

Costs increase directly with the amount of subaddress detail that is collected. When determining the amount of subaddress detail needed, consider how 9-1-1 applications will use the data and how precise the address point location needs to be. At a minimum, enough subaddress detail should be provided to route 9-1-1 calls to the

appropriate PSAP and get first responders to the correct location. Consider beginning with a low level of subaddress information and increase in granularity as time and resources permit. For example, collect subaddress information that will at least get responders to a specific building. Additional subaddress details may be needed where a large site or building is split by an Emergency Service Boundary and subaddresses at that location are served by different responding agencies.

11.3.4 Limitations of CAD Software

It is important to understand the limitations and requirements of your CAD software as currently not all CAD software programs can natively consume GIS data in NENA's NG9-1-1 GIS Data Model [1] format and may require the use of abbreviations or different parsing of the street names and addresses. Some optional fields may not be recognized and therefore population of those fields could be postponed. Consider the CAD software's ability to use stacked points, subaddress data in a related table structure, or even recognize subaddresses as unique addresses. Also consider whether the CAD software can differentiate between the Placement Methods or requires a specific Placement Method (e.g., Property Access versus Structure). For example, a structure located far from the road it is addressed off of may benefit from having two address points: a Property Access address point at the driveway entrance and a Structure address point on the structure. If the CAD software cannot differentiate between the two types of points, it may be preferred to only show one type of point.

11.4 Considerations for PSAP, Emergency Service, and Provisioning Boundaries

Organizations developing these GIS data layers need to understand that these layers often are not identical to the legal county, city, village, or other administrative boundaries within Missouri. Existing agreements between PSAPs that define their areas of responsibility, particularly in areas where the PSAP boundary differs from the administrative boundary, need to be properly reflected in the GIS data layers. As Missouri moves forward on the NG9-1-1 path, open and frequent coordination of boundaries between neighboring PSAPs and Emergency Services will become critical to ensuring no overlaps or gaps exist in these boundaries. This will involve particular focus on boundaries that follow physical (road centerline) or natural (water body) features where opinions may differ on jurisdiction for answering 9-1-1 calls.

11.4.1 Accuracy of the PSAP and Emergency Service Boundaries

There should be no unintentional gaps or overlaps within the PSAP Boundary layer or the Emergency Service Boundary layers. Gaps in PSAP boundaries prevent the ECRF from identifying the correct PSAP should a civic or geodetic location fall within that gap. Similarly, if a civic or geodetic location fell within an area where PSAP Boundaries overlapped, the ECRF would not be able to identify the correct PSAP. Similarly, gaps and overlaps within an Emergency Service Boundary would prevent the ECRF from determining the correct Emergency Service Provider.

Boundaries with unintentional overlaps also create issues for line segments. Overlapping areas result in attribution conflicts for Road Centerline segments in the overlapping area. Attribution conflict can include the address, area, and 9-1-1 attribution elements.

GIS Data Providers must work together to resolve any discrepancies in these layers such that there are no unintentional gaps or overlaps.

11.4.2 Accuracy of the Provisioning Boundary

There should be no unintentional gaps or overlaps within the Provisioning Boundary layer. Overlapping boundaries can result in multiple GIS Data Providers being able to submit GIS data for the same area, causing duplicate GIS features (e.g., Road Centerlines, Site/Structure Address Points) in the overlapping area. GIS Data Providers must work together to resolve these discrepancies such that their Provisioning Boundary covers the entire extent of their geographic area of responsibility but does not extend beyond their coverage area into a neighboring jurisdiction's geographic area of responsibility.

12 Quality Control of Next Generation 9-1-1 GIS Data

Quality Control is an all-encompassing management approach that combines technical, qualitative, and human resources to evaluate the quality of GIS data to meet the requirements of a system. Each GIS data layer, individually and in relation to others, is analyzed to determine where integrity issues exist.

Integrity issues for NG9-1-1 GIS data are separated into two categories: critical and non-critical. Critical errors will disrupt the NG9-1-1 Location Validation and Emergency Call Routing Functions and will not be accepted into the NG9-1-1 Core Services components. Non-critical errors have the potential to disrupt both functions, however additional features within the system will ensure the calls are correctly routed. Non-critical errors may be identified by the NG9-1-1 Core Services Provider but will not prevent the data from being provisioned into the system.

Prior to and during transition to a NG9-1-1 system, quality control between the 9-1-1 GIS data and the E9-1-1 routing databases, ALI and MSAG, must continue to be quality controlled through data synchronization. It is important to utilize the legacy street name elements within the Road Centerline and Site/Structure Address Point datasets for synchronization with the legacy E9-1-1 databases. Integrity issues identified during the data synchronization process may need to be resolved through updates to the ALI and/or MSAG and the GIS data.

The process for quality control can be dependent on a variety of factors; however, the major factors are the software utilized to perform the analysis, and the format of the GIS data. Resolution of all errors identified as ***Critical*** is of utmost importance. For NG9-1-1, 98% is often cited as a benchmark for resolution of GIS data errors and ALI to Road Centerlines errors, with a goal to continually improve the GIS data and achieve 100% resolution of all errors. Accuracy requirements should be discussed with your Next Generation 9-1-1 Core Services (NGCS) Provider.

12.1 Definitions of Commonly Used Quality Control Terms

12.1.1 Street Name Elements

Description: All the NENA CLDXF Standard [12] (fully spelled out) street name fields and/or all the legacy (abbreviated) street name fields in both the Road Centerline and Site/Structure Address Point feature classes.

CLDXF: Street Name Pre Modifier, Street Name Pre Directional, Street Name Pre Type, Street Name Pre Type Separator, Street Name, Street Name Post Type, Street Name Post Directional, Street Name Post Modifier

Legacy: Legacy Street Name Pre Directional, Legacy Street Name, Legacy Street Name Type, Legacy Street Name Post Directional

12.1.2 Zone

Description: Any field or combination of fields used to ensure location uniqueness.

CLDXF: May include Country, State, County, Incorporated Municipality

Legacy: May include MSAG Community Name and ESN

12.1.3 Address Elements

Description: All the address and subaddress elements including Address Number Prefix, Address Number, Address Number Suffix, Building, Floor, Unit, Room, Seat, Additional Location Information.

12.2 General Quality Control

The following checks should be performed during quality control for all GIS data layers.

- *Field format validation **(Critical)**:* Identify where fields are not formatted to meet the Missouri NG9-1-1 GIS Data Standard.

- *Unique Identifier **(Critical)**:* Identify duplicate unique identifiers within individual or all source feature classes.
- *Missing mandatory field values **(Critical)**:* Identify where mandatory field attribution, as defined in the Missouri NG9-1-1 GIS Data Standard, is missing.
- *Field values outside of domain:* Identify where field values are outside of the acceptable domain values as defined by the Missouri NG9-1-1 GIS Data Standard.

12.3 Boundary Quality Control

Includes Provisioning Boundary, PSAP Boundary and Emergency Service Boundary; may also include County Boundary, Incorporated Municipality Boundary, Unincorporated Community Boundary, and Neighborhood Community Boundary where available. Overlap errors are critical only for the Provisioning Boundary, PSAP Boundary, and Emergency Service Boundary layers.

- Boundary has overlaps **(Critical)**: Identify where overlaps exist between polygons in each boundary feature class.
- *Boundary does not cover the Provisioning Boundary **(Critical)**:* Identify where Emergency Service Boundaries do not cover the Provisioning Boundary in its entirety.
- *Boundary has gap:* Identify where gaps exist between polygons in each boundary feature class.

12.4 Site/Structure Address Point Quality Control

- *Address found multiple times **(Critical)**:* Identify where site/structure addresses occur multiple times in a single Site/Structure Address Point dataset. This check analyzes all the street name elements, address elements and zone(s) to determine duplication of address points.
- *Site/Structure Address Point outside Provisioning Boundary **(Critical)**:* Identify where site/structure address points exist outside of the Provisioning Boundary.
- *Site/Structure Address Point full address does not match parsed values:* Identify where the individual parsed address fields do not match the full address field.
- *Site/Structure Address Point zone attribution against intersecting polygon attribution:* Identify discrepancies between a site/structure address point's zone attribution (incorporated municipality) and the associated boundary (incorporated municipal boundary) it intersects within a buffer distance around the site/structure address point.

12.5 Road Centerline Quality Control

- *Road centerline segments have overlapping address range values **(Critical)**:* Identify where road segments have overlapping address ranges in a given zone. The zone must be defined by the governing entity.
- *Road centerline outside Provisioning Boundary **(Critical)**:* Identify where road segments exist outside of the Provisioning Boundary.
- *Road centerline segment crosses a boundary layer:* Identify where road segments cross a boundary and a split should occur. All boundaries where attribute values change should be included in the quality control. Includes, but may not be limited to: Incorporated Municipality Boundary, County Boundary, Provisioning Boundary, Emergency Service Boundary.
- *Road centerline segment FROM value is higher than the TO value:* Identify where road segment address ranges have a higher FROM value than TO value.
- *Road centerline full street name does not match parsed values:* Identify where the individual parsed street name fields of an address do not match the full street name field.
- *Road centerline segment has incorrect line directions:* Identify where road segments are drawn in the opposite direction of addressing.
- *Road centerline has incorrect one-way value:* Identify where roads are spatially continuous but one-way values are inconsistent or incorrect.

- *Road centerline has range gaps:* Identify where theoretically/potentially ranged road centerlines have address range gaps; zero ranged roads are ignored. *Only ran on counties with theoretical/potential ranging.*
- *Road centerline segment parity issue:* Identify where a road segment has a mixture of even and odd address ranges on the same side of the segment and conflicts with the Parity Left and Parity Right field values.
- *Road centerline segment not snapped to adjacent segments:* Identify where road segments are not snapped to an adjacent segment.
- *Road centerline segment has zero in address range value:* Identify where road segment address ranges have a zero in one address range value and a nonzero value in the other.
- *Road centerline zone attribution against intersecting polygon attribution:* Identify discrepancies between a road centerline's zone attribution (incorporated municipality) and the associated boundary (incorporated municipal boundary) it intersects within a buffer distance around the road centerline.

12.6 Site/Structure Address Point to Road Centerline Quality Control

- *Fail on full street name:* Identify where the site/structure address point's street name elements and road segment's street name elements are not identical.
- *Fail on zone:* Identify where the site/structure address point's address number and street name elements match the road segment but are not found in the same zone.
- *Fail on address range:* Identify where the site/structure address point's street name elements and zone match the road segment, but the address number falls outside of the road segment's address ranges.
- *Fail on block:* Identify where the site/structure address point's street name elements, zone and address number match the road segment, but the site/structure address point does not fall on the correct block.
- *Fail on parity:* Identify where the site/structure address point's street name elements, zone and address number match the road segment, but the site/structure address point falls on the wrong side of the road segment.

12.7 Synchronization of ALI and MSAG to GIS Data

12.7.1 ALI to Road Centerline Synchronization

- *Fail on full street name:* Identify where the ALI street name elements and road segment's street name elements are not identical.
- *Fail on zone:* Identify where the ALI address number and street name elements match the road segment but are not found in the same zone (ESN and MSAG Community).
- *Fail on address range:* Identify where the ALI street name elements and zone (ESN and MSAG Community) match the road segment, but the address number falls outside of the road segment's address ranges.

12.7.2 ALI to Site/Structure Address Point Synchronization

- *Fail on full street name:* Identify where the ALI street name elements and site/structure address point's street name elements are not identical.
- *Fail on zone:* Identify where the ALI address number and street name elements match the site/structure address point but are not found in the same zone (ESN and MSAG Community).
- *Fail on address range:* Identify where the ALI street name elements and zone (ESN and MSAG Community) match the site/structure address point, but no exact address number match can be made.
- *Fail on address number suffix:* Identify where the ALI address number, street name elements and zone match the site/structure address point, but no exact address number suffix match can be made.

12.7.3 MSAG (Low and High) to Road Centerlines

- *Fail on full street name:* Identify where the MSAG street name elements and the road segment's street name elements are not identical.

- *Fail on zone:* Identify where an MSAG address range (high or low) and street name elements match the road segment but are not found in the same zone.
- *Fail on address range:* Identify where the MSAG street name elements and zone match the road segment, but no exact address range value match can be made.

12.8 Quality Control Exceptions

Exceptions are flags at the feature level that notify QC checks to omit a feature from a specific check. Features may have multiple exceptions. Exceptions should only be used to accommodate real-world situations that are identified as errors in the quality control process. Caution should be used when setting exceptions for features within a GIS dataset and should only be used when there is a viable exception that will cause an error to be identified. While there is no single, specific process of implementing exceptions and the use of exception codes, the typical process is to add an exceptions field to each GIS data layer and populate with a defined code for each needed exception at the feature level. For example, it is common for a structure to be addressed on the wrong side of the road. An exception code can be used in the NG9-1-1 system to allow the exception through and not be marked as an error. The proper use and domain of exception codes will be determined as part of the State's NG Core Services implementation.

13 Parsing Street Names and Addresses into the Missouri Standard

The Address Number is the integer portion with anything preceding the integer being placed in the Address Number Prefix field and anything following the integer being placed in the Address Number Suffix field. Table 13-1 provides examples of how to parse address numbers into their appropriate fields.

Table 13-1 Example Parsing of Address Numbers

Address Number Prefix	Address Number	Address Number Suffix	Street Name Pre Modifier	Street Name Pre Directional	Street Name Pre Type	Street Name Pre Type Separator	Street Name	Street Name Post Type	Street Name Post Directional	Street Name Post Modifier	Unit
	123	A					Highridge	Drive			
	1209	D		Northwest			North Ridge	Drive			
	123	1/2					Prospect	Avenue			
	4032	A		South			Lynn Court	Drive			
	16423	1/2		East			29th	Street Court	South		
	11408			East			272nd	Street			L11
	110			East			Canada	Street			Lot 1

Parsing street names into the appropriate elements is usually straightforward and mirrors how the street name is parsed in legacy 9-1-1 databases. Typically, the Street Name Pre Modifier, Street Name Pre Type, Street Name Pre Type Separator, and Street Name Post Modifier elements are not found in legacy 9-1-1 databases that were based on the USPS Publication 28 [5] postal addressing standard. Of these four new fields, the Street Name Pre Type field will be the one most used, mostly for numbered routes. The other three fields are not commonly used but must be populated if the address parsing rules apply. It is recommended to avoid assigning new Street Names that require usage of the Street Name Pre Modifier or Street Name Post Modifier fields.

Details on each Street Name element are provided in Section 3 Road Centerline – Data Element Details. The NENA CLDXF Standard [12] defines the detailed civic location data elements needed for address data exchange. Review of the document is strongly recommended as it provides an in-depth discussion of address parsing for NG9-1-1 purposes.

Table 13-2 provides examples of how to parse Street Names into their appropriate fields. Footnotes immediately follow the table to explain the parsing of Street Names that have special considerations.

Table 13-2 Example Parsing of Street Names

Street Name Pre Modifier	Street Name Pre Directional	Street Name Pre Type	Street Name Pre Type Separator	Street Name	Street Name Post Type	Street Name Post Directional	Street Name Post Modifier
				Prospect	Avenue		
	North			Lane	Avenue		
	Northwest			North Ridge[1]	Drive		
	West			North Main[1]	Street		
	East			11th	Street Court[2]	North	
	South			Lynn Court[2]	Drive		
	East			10th Terrace[2]	Court	North	
	East			14th Terrace[2]	Drive	North	
	East			24 Highway[2]	Circle		
				Blue Ridge[2]	Extension		
	East			29th	Street Court	South	
	East	State Route		58			
				Alley	Street		
				Golf Club	Drive	South	
	East			Lone Jack Lee's Summit[3]	Road		
	South			Fox's Den[3]	Road		
	Northwest			D'Mons[3]	Drive		
				Bi-State[3]	Drive		
				Hi-View Ridge[3]	Drive		
	Northwest			Sni-A-Bar[3]	Terrace		
				Tam-O-Shanter[3]	Drive		
				Blue Ridge Cut Off			
				Street of Dreams			
				Worlds Of Fun	Avenue		
				Burlington Northern	Road		
				Saint Catherines[4]	Lane		
Old	North	Highway		63			
		Highway		63	Connector		
Business		Highway		63			
		Interstate		35			northbound[5]
	North	Highway		291			
	East	United States Highway		60			
Old		Route		A			
Old		United States Highway		40			
		Route		O			
		Interstate		35/29[3/6]			northbound[5]
	South	State Highway		ZZ			
	West			Farm Road 84			
				Buttonwood			Access[7]
Old	North			Number 7			
				Old Number 7			
Old[8]				Number 7			
		Rue[9]		Orleans			
		Rue[9]	de	Renard			
		Avenue	of the	Columns			
	North			Lake of the Woods[10]	Road		
West[11]	South			4th	Street		
	West			South 4th[12]	Street		
	West			Business Loop 70			
				Old Hawthorne	Drive	East	

NOTES:

[1] When the Street Name is the name of a place, geographic feature, landmark, or other similar feature, the directional is included in the Street Name field and is not parsed as a Street Name Pre Directional (requires local knowledge as to whether the directional is part of the name of the place, geographic feature, landmark, or other similar feature).

[2] When two Street Name Post Types occur after the Street Name, both are placed in the Street Name Post Type. However, if local addressing rules consider the first occurrence part of the Street Name, the first occurrence is included in the Street Name field and the second is parsed as a Street Name Post Type.

[3] Special characters are allowed in NG9-1-1 Street Name fields which have a field type of Printable ASCII characters (decimal codes 32 to 126) or UTF-8-character sets. Consult with your Core Service Provider regarding their recommendation for current 9-1-1 and CAD system requirements.

[4] All street name field values must be fully spelled out to remove confusion and ambiguity. This is important as abbreviations could have multiple interpretations. For example, "ST" could be Saint, Street, or Sandra Theresa (someone's initials).

[5] The traveling direction on divided roads is parsed as a Street Name Post Modifier (in lowercase).

[6] Some street names are a combination of two route numbers or a route number and a local street name. When the street name is a combination of two route numbers, the jurisdiction is placed in the Street Name Pre Type and both route numbers are placed in the Street Name, typically separated by '&', '/', or 'and' (note: the separator used should be consistent across the jurisdiction). When the street name is a combination of a route number and a local street name, both are placed in the Street Name. Alternatively, the first name is parsed normally, and the second name is placed in the Street Name Post Modifier. In all cases, consult with your Core Service Provider regarding their recommendation for current 9-1-1 and CAD system requirements.

[7] Since "Access" is not in USPS Publication 28, Appendix C1 [5], it is parsed as a Street Name Post Modifier.

[8] A Pre Modifier must be separated from the Street Name by either a Street Name Pre Directional or a Street Name Pre Type unless the Street Naming Authority has established a local practice where words such as "Business" or "Old" that precede a Street Name are placed in the Street Name Pre Modifier field so the Street Name can be placed properly in an alphabetized list.

[9] Foreign language (e.g., French, Spanish, Italian) equivalents of Street Name Pre Types and Street Name Pre Type Separators are parsed into these fields and not in the Street Name field.

[10] Since "Lake" is not a valid Street Name Pre Type and is not in USPS Publication 28, Appendix C1 [5], it is included in the Street Name.

[11] When two directional words occur together before the Street Name and the second directional is not the name of a place, geographic feature, landmark, or other similar feature, the first occurrence is a Street Name Pre Modifier and the second is a Street Name Pre Directional.

[12] When two directional words occur before the Street Name and the local addressing rules consider the second occurrence part of the Street Name, the second occurrence is included in the Street Name field and the first is parsed as a Street Name Pre Directional.

14 Road Centerline Recommendations and Best Practices for Development and Maintenance

14.1 General Best Practices

The Quality Control checks described in Section 12, Quality Control of Next Generation 9-1-1 GIS Data, provide valuable information on how the validation software looks at the Road Centerline layer to identify integrity issues and ensure consistent, valid data throughout the dataset. Ensuring that the data meets the requirements of the Road Centerline QC checks and the synchronization of the ALI and MSAG to the Road Centerline layer will eliminate unnecessary rework and ensure that the data meets the required specifications for the NG9-1-1 LVF and ECRF. Quality control is a continuous process. The data maintenance plan for the Road Centerline layer must include these QC checks and, at a minimum, resolution of all critical errors.

Road centerlines should be compiled from current orthoimagery or a high-quality data collection device, and attributed using source data with reliable attribution. The accuracy of the Road Centerline layer is only as good as the least accurate data source or data collection device that was used to create it.

14.2 Road Centerline Digitizing Direction

Road centerlines should be digitized in the direction of increasing addressing. Highways and other unaddressed limited-access roads should be digitized in the direction of increasing mile marker numbering, the direction of

the local addressing grid, or the direction of travel. Whichever method is chosen, it is important to be consistent throughout the jurisdiction.

Limited access roads typically have some type of physical barrier (e.g., concrete wall or curb, metal barrier, grassy median, ditches) separating the opposing traffic flow. These should be digitized with two centerlines, each representing a different direction of travel. A single centerline is used when there is only yellow painted striping or a flat surface separating the opposing traffic flow that can be easily driven over without damaging a vehicle.

Cul-de-sacs should be digitized showing the center physical median when it exists. This is important for fire responders who need to know limitations of turning a large vehicle around in the cul-de-sac. If there is no physical median, the road centerline should extend straight through the cul-de-sac, ending on the pavement.

Addressed roads with parity issues and unaddressed local or private roads should be digitized following the direction of the local addressing grid. If a local addressing grid does not exist, they should be digitized in the same direction as other nearby road centerlines.

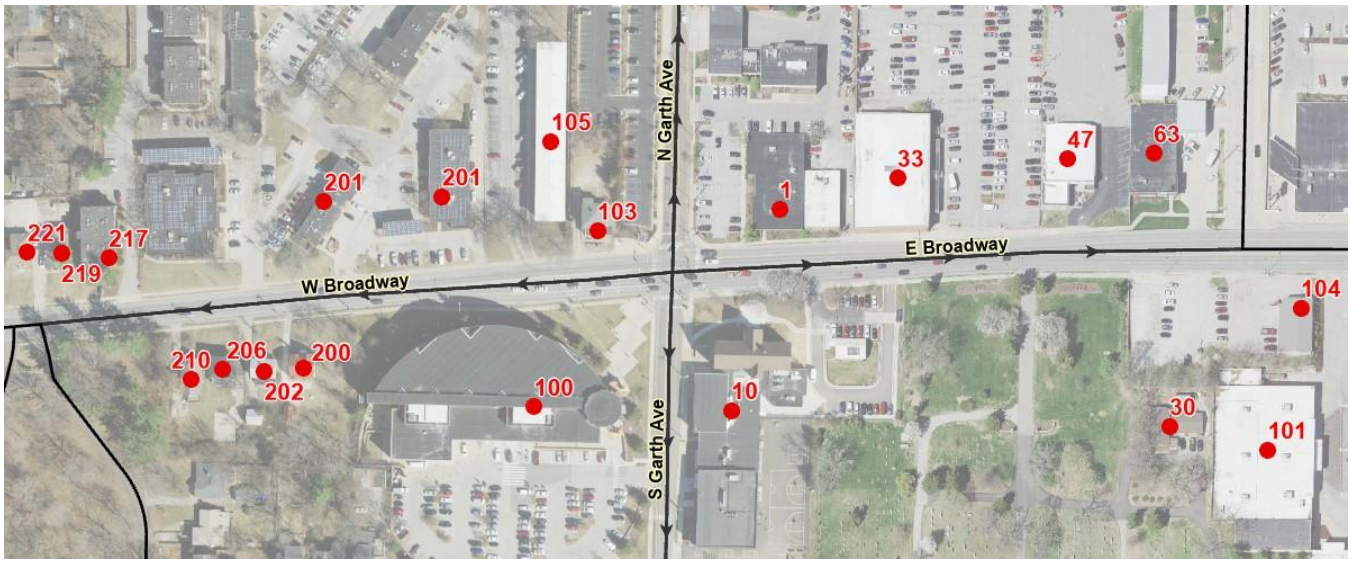


Figure 14-1 Digitizing Segments in the Direction of Increasing Addresses

14.3 Road Centerline Segmentation

Road segmentation is an important consideration during development and maintenance of the NG9-1-1 Road Centerline layer. Road segments should be split in the following:

- Road intersections
- Boundaries: County, Incorporated Municipality, PSAP, Emergency Services, ESN, MSAG Community
- Change in the Street Name
- Change in other attribute values: One-Way, Speed Limit, Road Class (only if these Optional fields are being maintained in the Road Centerline layer)
- Other boundaries (where available): Unincorporated Community, Neighborhood Community, Postal Community (only if these Optional fields are being maintained in the Road Centerline layer)

Intersections at overpasses and underpasses are only segmented if they carry elevation data that can be used to determine if the intersection is at-grade or an overpass/underpass. Consultation with the Core Services Provider and understanding the requirements of the local CAD software is necessary to determine when an overpass/underpass intersection should be segmented.

In most cases, roads should not be split at driveways or parking lots. There are some situations where splitting a road centerline at these intersections may be beneficial for routing first responders, particularly in rural areas where there are not many addressed properties or where an addressed structure may not be visible from the

road. Breaking a road centerline at these intersections allows the address ranges to be refined, providing more accurate geocoding results.

Special consideration is needed for segmentation at intersections with unaddressed alleys. Generally, if an alley is named and routable, the intersecting street should be broken. However, these named alleys should be assigned a very low speed limit (e.g., 5 or 10mph maximum) to deter Automatic Vehicle Location (AVL) from choosing them as preferred routing options. Inclusion of unaddressed alleys is a local decision and should take the capabilities of the local CAD software into consideration.

There are often specific requirements for road segmentation based on the needs of the local CAD software and attributes that may need to be carried in the Road Centerline layer to support CAD functionality. Consultation with the Core Services Provider and understanding the requirements of the local CAD software is necessary to determine when additional segmentation may be needed.

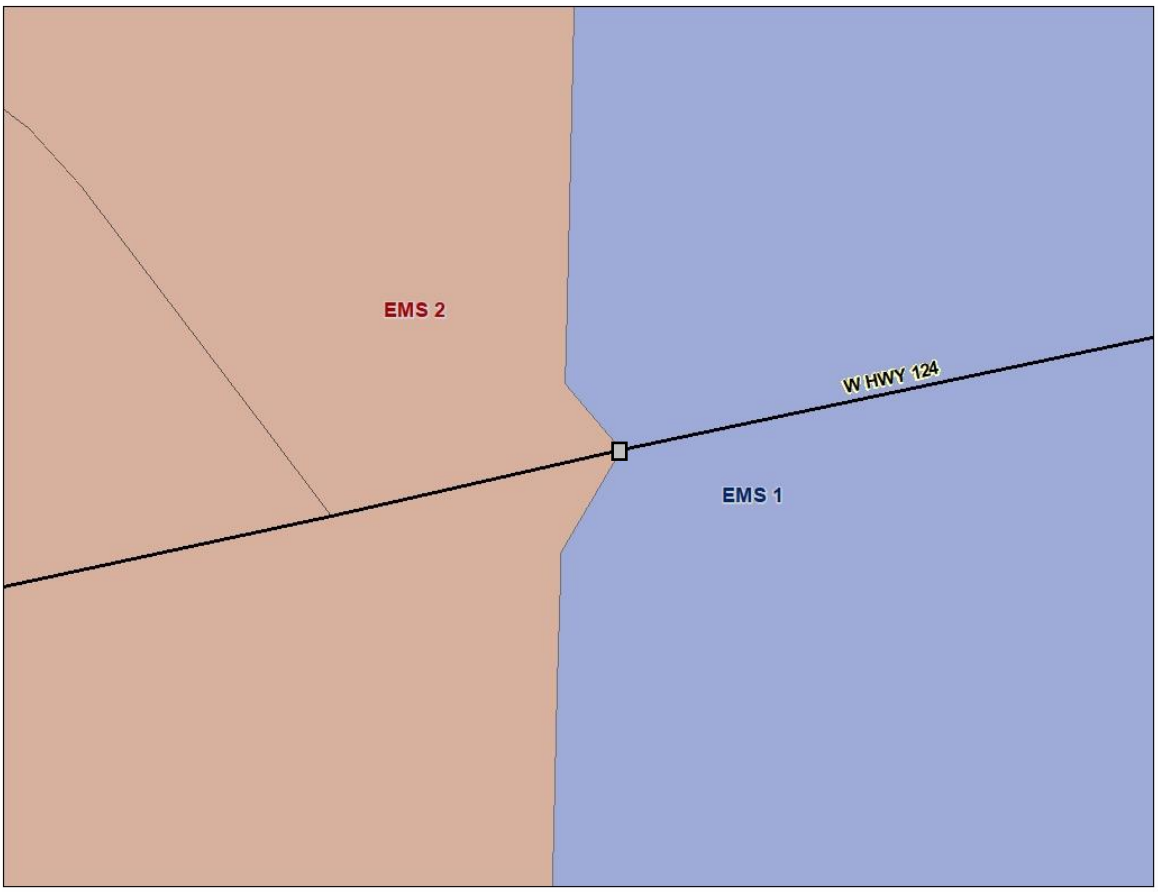


Figure 14-2 Road Centerline Split at Boundary Changes

Alignment at Boundaries

Aligning Road Centerlines at boundaries is essential for providing accurate locations for the NG9-1-1 Location Validation and Emergency Call Routing Functions and other 9-1-1 applications that rely upon geocoded locations derived from the Road Centerline address ranges. Road Centerlines must be aligned and snapped to boundaries with different jurisdictions or emergency service responsibilities so that the geocoded locations fall within the correct jurisdiction, PSAP, and Emergency Service Provider boundaries. These boundaries include:

- PSAP Boundary
- Emergency Service Boundaries
- State Boundary
- County Boundary

- Incorporated Municipality Boundary
- Military Installation Boundary, if applicable

If a Road Centerline is contiguous with a boundary (e.g., County Line Road), it must be aligned with the corresponding boundary, node for node. This is especially critical for Emergency Call Routing where the slightest deviation may result in a geocoded location being placed into the wrong PSAP Boundary polygon, causing the call to be routed to the incorrect PSAP.

Agreement on exactly where these boundaries are located is necessary for emergency response and data maintenance responsibilities. It is recommended that a "stitch point layer" be created that represents the location of points where GIS data from one jurisdiction ends and where the GIS data for the adjacent jurisdiction begins. These would be points where road centerline segments would be snapped to and the vertices where polygon boundaries between neighboring jurisdictions would need to align and be snapped to. Counties and local municipalities must agree on the location of these points both within Missouri and between their neighboring states. These points do not need to represent formal or legal boundaries but instead represent their agreed upon location for data maintenance purposes.

When aligning road centerline data with these neighboring jurisdictions, counties and other states, care should be taken to ensure that there are no spatial overlaps or gaps in the data. Working directly with the neighboring jurisdictions will greatly reduce these issues with the data.

In some cases, a PSAP Boundary does not align with a County Boundary due to the agreed upon response areas. Road centerlines must be split at the PSAP boundary and the County Boundary, regardless of how close they may be located to each other. Figure 14-3 below shows West 161st Street split at the Clay and Ray County line. Even if the address in Clay County is within the Ray County PSAP Boundary, West 161st Street must still be split at the county boundary to accommodate the Area Name elements (e.g., County, Incorporated Municipality).

Figure 14-3 Road Dead-Ending in Adjacent County

14.4 Naming and Addressing

Address Ranges

For use in NG9-1-1, the address ranges on adjacent Road Centerlines with the same street name that are within the same jurisdiction must not have unintentional gaps and overlaps. In Missouri, intentional gaps may exist at

jurisdictional boundaries (e.g., ranges change from 4-digit numbers to 6-digit numbers) and at changes in the local addressing grid. When a street name extends over a boundary, the address ranges should be checked to confirm that there are no unintentional gaps or overlaps in the address ranges. Any issues should be brought to the attention of the local Addressing Authorities for resolution so that the address ranges properly reflect the addresses each PSAP is responsible for on the Road Centerlines within their PSAP Boundary.

There is no NENA requirement for address ranges to be populated as potential address ranges (also known as theoretical or buffered ranges) or as actual address ranges. There are pros and cons with each method, although potential address ranges generally require less maintenance. Consultation with the Core Services Provider and understanding the requirements of the local CAD software and other local GIS needs may impact which address range method to use.

Currently, some jurisdictions utilize 0-0 address ranges to accommodate local CAD software requirements such as on the median side of limited-access roads or within a large intersection of a divided road where there is no gap in the assigned addresses on each side of the intersection. In general, 0-0 address ranges should be avoided as 0-0 ranges may conflict with some quality control processes (e.g., duplicate 0-0 address ranges with the same Street Name). On rare occasions, an address range may need to start with 0 if the first assigned address has a value less than one (e.g., ½, ¼, .5).

Different Street Names on Each Side of the Road Centerline

There are some roads along jurisdictional boundaries that have been assigned different street names on each side of the road. This can be confusing to responders and require GIS data to be falsely portrayed in order to include both street names for use in the NG9-1-1 LVF and ECRF. Rather than trying to make the GIS data fit the situation, the Street Naming Authorities should work together to come to agreement on a single street name that can be used for both sides of the street. If a common resolution is unable to be obtained, it is recommended that two road centerlines be created and placed slightly offset and parallel to each other, representing their direction of travel, and be reunited at a single point at intersections. Each alignment would be populated with the Street Name as assigned by its Street Naming Authority and addressed only on the side of the road with that Street Name. Stacked road centerlines are not recommended as they may cause issues with local CAD systems.

Road Centerline in a Different Jurisdiction than the Addressed Properties

On occasion, jurisdictional boundaries may parallel and fall along one side of a road centerline rather than being coincident with the road centerline. For NG9-1-1 Location Validation and Emergency Call Routing purposes, the road centerline attributes must reflect the addressed properties on each side of the line segment, regardless of where the physical roadway is located.

Interstates/Highways

Interstates and limited-access highways are named with their jurisdiction and route number. Travel direction (e.g., northbound, southbound, eastbound, westbound) is often not part of the official street name but is important for responders and other service providers that need to know which side of the highway a location is associated with. It is recommended that the travel direction be included in the Post Modifier in lowercase as “northbound”, “southbound”, “eastbound”, or “westbound”.

Example: I70 EB and I49 NB

Street Name Pre Type:	Interstate
Street Name:	70
Street Name Post Modifier:	eastbound
Street Name Pre Type:	Interstate
Street Name:	49
Street Name Post Modifier:	northbound

Ramps and Interchanges

Ramp and interchange naming can be particularly challenging. It is strongly recommended that as much information as possible be put into the Street Name field for ramps, including the FROM road, TO road, travel direction, designation as an on ramp or off ramp, and exit number as appropriate. Ramps should be single segments unless a physical barrier exists that splits the ramp for separate travel directions.

The following ramp naming convention is recommended, with everything placed in the Street Name field:

<Ramp/Exit #> <FROM Street> <travel direction> to <TO Street> <travel direction>

Where:

- **Ramp/Exit #:** The text "On Ramp" or "Off Ramp" and, if applicable, "Exit <#>"

  Note: If there is no exit number for ramps connecting an undivided road and a limited-access road, then "On Ramp" and "Off Ramp" are preferred to a generic "Ramp" designation.

- **FROM Street:** Route/Street Name that the ramp is exiting from
- **TO Street:** Route/Street Name that the ramp is going to
- **Travel direction:** NB, SB, EB, WB

Due to the current 60-character field width limitation of the Street Name field, some abbreviations are necessary for the ramp names. For consistency, abbreviations are allowed ONLY for the travel direction (i.e., NB, SB, EB, WB) and the road jurisdiction for numbered routes in a ramp name. Everything else must be fully spelled out. The allowable abbreviations for the road jurisdiction in a ramp name are:

- I – Interstate
- HWY – United States Highway, State Highway
- M – Missouri Route, Missouri Highway
- RTE – State Route, County Route
- CR – County Route

Example ramp names using the recommended ramp naming convention:

- **Street Name:** Off Ramp Exit 115 I70 EB to W HWY BB NB
- **Street Name:** Off Ramp Exit 127 I70 EB to MO763 NB
- **Street Name:** Off Ramp 291 HWY NB to N 210 HWY SB
- **Street Name:** On Ramp Oak Trafficway SB to I 70/35 EB

An alternate ramp naming convention can be utilized when established in a jurisdiction. For example, a ramp's street name field could also be N PROVIDENCE RD ONR EB. The key for naming ramps is to be consistent in the method used.

14.5 Overlapping Routes and Multiple Street Names

Street names are an important part of an NG9-1-1 system. However, in many cases, roads can be known by several different street names. Local jurisdictions may assign a local name for a road, while the Missouri Department of Transportation (DOT) may assign a state highway number to that same road. As a further complication, the road may also carry a US route number, a second state route number, a county route number, or a memorial or honorary name for that same road.

These multiple street names are all important, however, the official 9-1-1 name assigned by the Street Naming Authority is the Street Name that must be populated in the Road Centerlines layer for NG9-1-1 Location Validation and Emergency Call Routing purposes. A future version of this Missouri NG9-1-1 GIS Data Standard and Best Practices document is expected to contain an Alias Street Name Table. This future related table will allow an unlimited number of alias street names to be cross referenced to individual segments in the Road Centerline layer. The Alias Street Name Table will parse the alias street names into the same street name elements as used in the Road Centerline layer.

Organizations with local CAD systems that can currently use related tables should consider developing an Alias Street Name Table now in a format that can be used by their CAD system, if time and resources permit. More advanced CAD systems may allow alias street names to be parsed into the Street Name elements while others may initially only be able to handle a simple concatenated full street name. Any work done now would not be lost but would instead be an important first step for developing the future NG9-1-1 Alias Street Name Table.

Street Naming Hierarchy

For NG9-1-1 purposes, the official 9-1-1 name assigned by the Street Naming Authority is the Street Name that must be populated in the Road Centerlines layer. All other names are considered alias street names and would be populated in the Alias Street Name Table.

Where named and numbered roads overlap, it is usually clear which street name is the official 9-1-1 street name to populate in Road Centerline layer. However, there are some situations where the street name overlap is in a small, limited area (e.g., traffic circles, roundabouts, exit ramps that lead to multiple roads) and determining which official 9-1-1 street name to populate in the Road Centerlines layer may not be straightforward. For these situations where two official 9-1-1 Street Names overlap, follow this hierarchy for populating the Street Name in the Road Centerlines:

- Interstate Name (highest priority)
- Interstate Business Route name
- US Route name
- US Business, Alternate, or Truck Route name
- State Route name
- State Business, Alternate, or Truck Route name
- County Route Name
- Other local or memorial street name (lowest priority)

Using this hierarchy, the highest jurisdiction route name would be put into the Road Centerline Street Name, and the lower jurisdiction route would go into the Alias Street Name Table. When multiple routes with the same jurisdiction overlap, the lowest route number would go into the Road Centerline Street Name and the higher route number(s) would go into the Alias Street Name Table.

For example, sometimes an exit ramp leads to more than one connected road but only one of the connected street names can be used for the “TO Street” in the ramp name. For the road centerline leaving the “FROM Street,” the “TO Street” in the ramp name should follow the naming hierarchy above and be populated with the highest jurisdiction route name. The lower jurisdiction route would go into the Alias Street Name Table. At some point, the ramp will split and the centerline for each ramp after the split should be named with the “TO Street” for the connected road it leads to.

14.6 Roundabouts and Traffic Circles

Naming of roundabouts and traffic circles can be complicated, particularly when routes overlap the official 9-1-1 street name or when street names end or change at the circle. Many of the Street Naming Hierarchy concepts discussed above in Section 13.1.5 Overlapping Routes and Multiple Street Names can be applied to roundabouts and traffic circles. At the time of publication of this standard additional work on the best practices for roundabouts in Missouri has been placed into the Items Pending Future Work.

14.7 Military Bases

Military bases may or may not have their own PSAP and responsibility for emergency services. In most cases, the military facility will share street name information but will not provide address specific information. It is recommended that the local 9-1-1 jurisdiction reach out to the military facility and work directly with them to obtain the most current information the facility is willing to provide.

15 Site/Structure Address Point Recommendations and Best Practices for Development and Maintenance

15.1 General Best Practices

The Quality Control checks described in Section 11, Quality Control of Next Generation 9-1-1 GIS Data, provide valuable information into how the validation software looks at the Site/Structure Address Point layer to identify integrity issues and ensure consistent, valid data throughout the dataset. Ensuring that the data meets the requirements of the Address Point QC checks, Address Point to Road Centerline QC checks, and the synchronization of the ALI to the Site/Structure Address Point layer will eliminate unnecessary rework and ensure that the data meets the required specifications for the NG9-1-1 Location Validation and the Emergency Call Routing Functions. Quality control is a continuous process. The data maintenance plan for the Site/Structure Address Point layer must include these QC checks and at a minimum, resolution of all critical errors.

Address point placement should be based on an authoritative list of addresses, current orthoimagery or a high-quality data collection device, and source data with reliable attribution. The accuracy of the Site/Structure Address Point layer is only as good as the least accurate data source or data collection device that was used to create it.

Given today's navigation technologies used by consumers and emergency responders, it is strongly recommended that Addressing Authorities assign an address based on the named road used to access the structure. This is especially important when there is no direct access from the road that the front entrance to the addressed structure faces. Emergency responders may waste valuable time backtracking to an address if the assigned address does not provide the most direct route to the structure.

15.2 Address Point Placement

The NENA Information Document for Development of Site/Structure Address Point Data for 9-1-1 [13] provides detailed guidelines on address point placement and subaddress data development. Review of the document is strongly recommended as it provides an in-depth discussion of five address point placement methodologies that meet NG9-1-1 Location Validation and Emergency Call Routing requirements. These include:

- **Geocoding:** Placement of an Address Point Based on Geocoding off of Road Centerlines
- **Parcel:** Placement of an Address Point Based on a Parcel
- **Site:** Placement of an Address Point Based on a Site
- **Structure:** Placement of an Address Point Based on a Structure(s)
- **Property Access:** Placement of an Address Point Based on Property Access

The document also includes a section on Address Point Placement for Subaddresses (specific locations within structures, sites, or within a group of structures and/or sites). As such, the NENA Information Document for Development of Site/Structure Address Point Data for 9-1-1 [13] should be considered a companion document to Section 15.2 Site/Structure Address Point Best Practices in this document.

Address point placement is especially critical for NG9-1-1 Emergency Call Routing and dispatch. During NG9-1-1 Emergency Call Routing, the location of an identified address point is spatially compared to the PSAP Boundary to determine which PSAP to send the call. The location of the same identified address point is also spatially compared to the Emergency Services Boundaries to provide the call taker with the recommended Law, Fire and EMS providers that should respond to the call. The address point must fall within the correct PSAP Boundary or valuable time will be lost for call transfer to the correct PSAP.

Address Point versus Access Point

Address points are typically placed on the addressed feature (e.g., a structure or a site). However, there are some situations where an access point may be preferred. An access point is the point of access to the addressed feature and may represent a driveway, gate, an entrance to a building containing multiple addresses, or other entrance. Access points can also be used for a building with multiple entrances where each entrance serves

many specific addresses (e.g., a high-rise building where certain entrances only allow access to units on specific floors.)

The access point can be useful for directing emergency responders to a structure that may be located far from the road it is addressed off of or may share a long driveway with several other addressed structures as shown below in Figure 15-1. In such cases, it may be useful to include an address point and an access point. Access points should be placed as a Property Access address point, offset from the road centerlines and in alignment with the direction of the increasing address ranges. Attributes on a Property Access address point should be populated with the same values as on the Structure address point it represents, with only the Placement Method attribute being populated differently. This is regardless as to whether the access point is physically located in a different jurisdiction or responder area since its location only represents from where off of a named road one would turn to access the addressed structure.

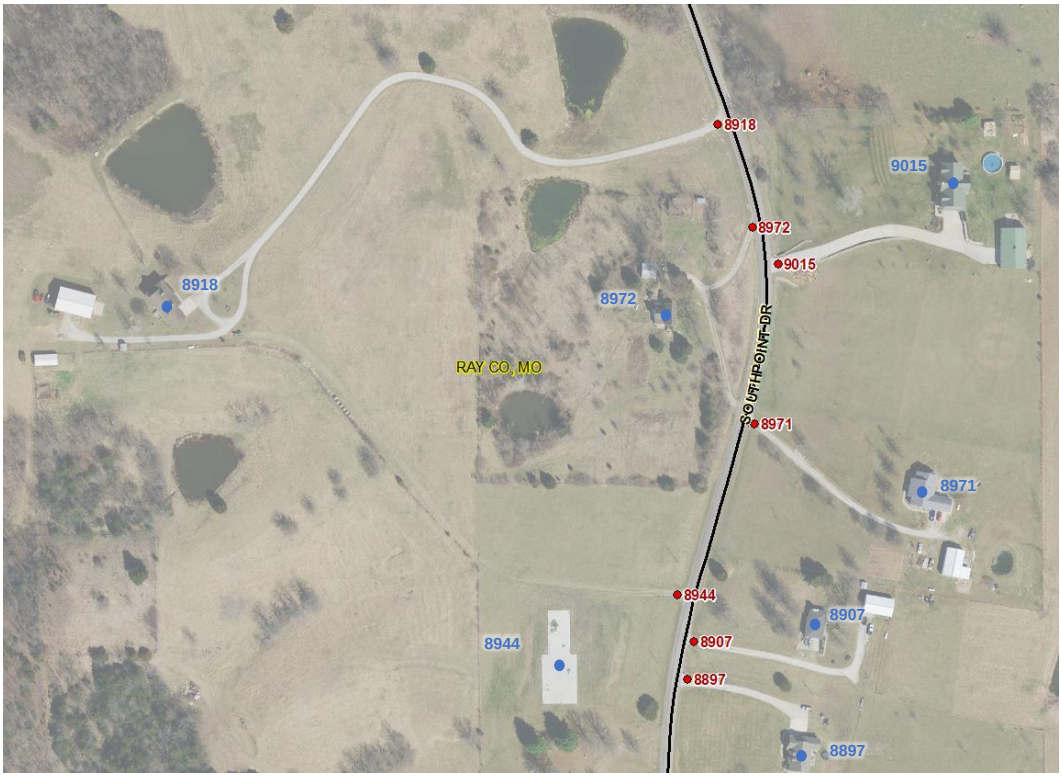


Figure 15-1 Structure Address Points structure placement versus driveway placement

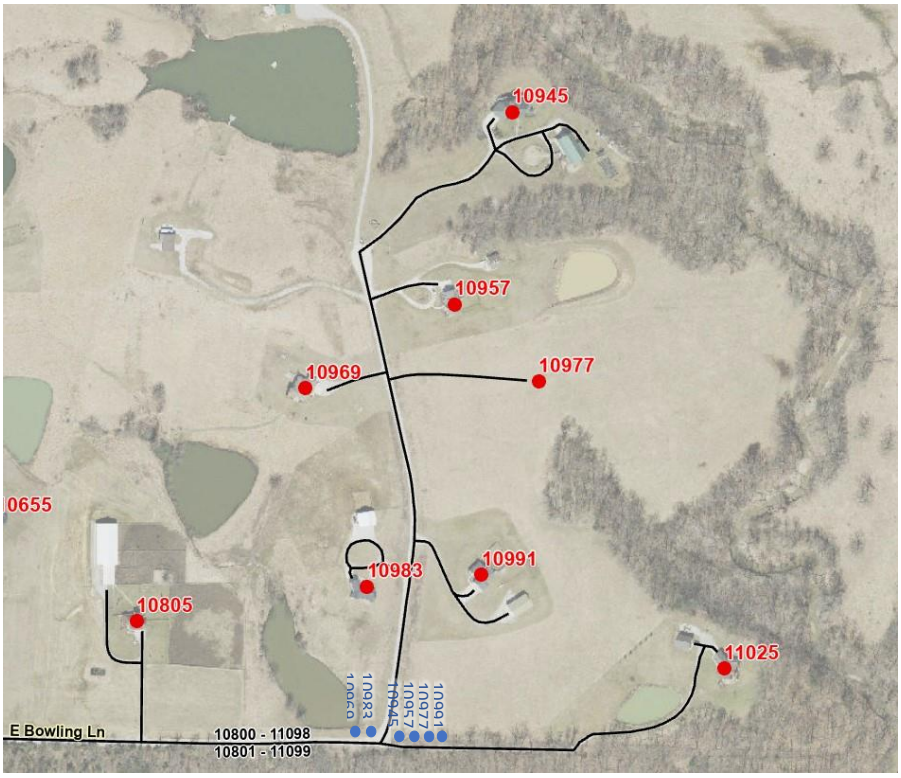


Figure 15-2 Structure Address Points on structures with property access address points at the shared driveway

An access point can also be useful for directing emergency responders to the correct structure in a more expeditious manner when an addressed location has multiple entrances to the property as shown below in Figure 15-3, where there a single entrance into a business complex addressed along East 87th Street with multiple entrances along Elmwood Avenue for the three addressed structures.

Figure 15-3 Property Access Address Points Indicating the Entrance to Use to Reach the Structure

Road reconstruction projects for more safe and efficient traffic flow may result in the access to addressed properties being relocated so that access is from a different road than what the property is addressed off of, as shown below in Figure 15-4. If the properties are unable to be readdressed to the new access road (which is strongly recommended), then including both a Structure address point and a Property Access address point may benefit emergency responders by directing them to the relocated entrance. In Figure 15-4 all structures along Colony Drive are address from Forum Boulevard.

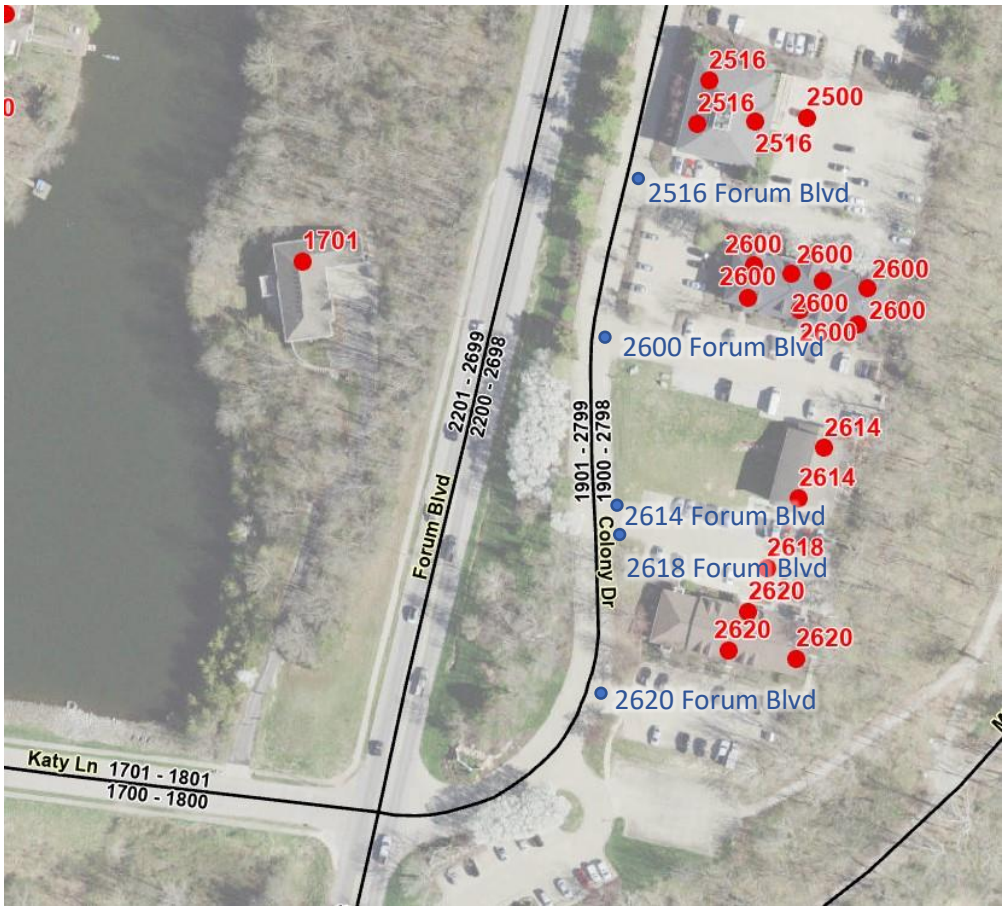


Figure 15-4 Property Access Address Points indicating the entrance to use to reach the Structures

If both an access point and address point are shown, population of the Placement Method attribute is strongly recommended to clearly differentiate the two points. It also provides a means to easily remove one or the other if a 9-1-1 application is unable to differentiate between them. Currently, the NENA Standard for NG9-1-1 GIS Data Model [1] only defines one Placement Method, Property Access, that specifically represents an access point "based on the location of the primary access to a given property". See NENA Information Document for Development of Site/Structure Address Point Data for 9-1-1 [13], Section 3.4.5 Placement of an Address Point Based on Property Access, for more information.

15.3 Address Point Placement for Special Cases

In most cases, address point placement is straightforward with points placed on the center of a structure or site. Large structures or sites, particularly those with multiple entry points, may benefit by having the address point placed at the primary entrance to the structure or site. However, there are some situations that may require a little more research or even field visits to determine the correct placement location.

Multiple Addresses or Units within a Single Structure

Shopping centers, commercial buildings, condominiums, and duplexes contain multiple businesses or residences that are located within the same structure. In some cases, the individual units have been addressed with their own individual address number but in many situations, they share the same address number and are only

differentiated by subaddress information (e.g., apartment, unit, suite, etc.). In both situations, address point placement is usually based on whether the units share an entrance to the building or have their own separate entrance.

Generally, Structure address points should be placed at or near each addressed unit's building entrance, just within the building footprint and near the building base. This will keep the address points very close to their true location, even if future imagery shifts slightly, and will help avoid the urge to move the address points each time new imagery is acquired. This point placement method is shown in Figures 15-4 and Figure 15-5 below, where each unit in a shopping center has its own separate entrance.

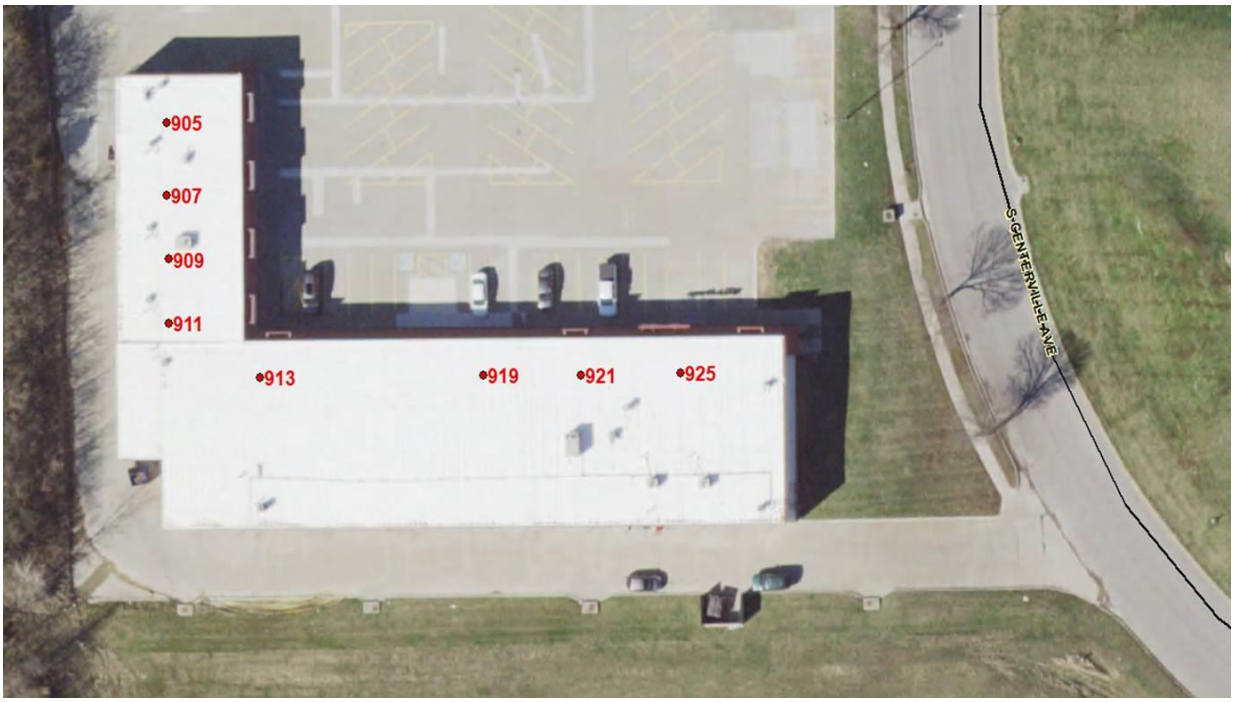


Figure 15-5 Multiple addresses within a single structure, all with separate entrances

Figure 15-6 Multiple addresses within a single structure, all with separate entrances with upper-level apartments addressed based on entrance location

For Figure 15-6 the single structure along East Broadway Avenue is two stories. The second story apartments at both ends of the block are addressed based on their entrance locations along North Main Street and Elizabeth Street.

When addressed units share a common entrance, typical practice is to stack the address points at the shared building entrance as exactly where within the structure an individual unit is located is usually unknown. Structure address points should be placed just within the building footprint, near the shared entrance for the addressed unit. Consultation with the Core Services Provider and understanding the requirements of the local CAD software is necessary to determine whether stacked points can be used.

In Figure 15-7 below, two buildings share the same address with each building having two primary entrances. Each entrance provide access to four separate apartments. Four Structure address points are stacked at each building entrance, representing the four apartments that can be accessed through that entrance. Providing this level of detail for complicated addressing situations will help direct responders to the correct entrance, saving valuable time during an emergency.

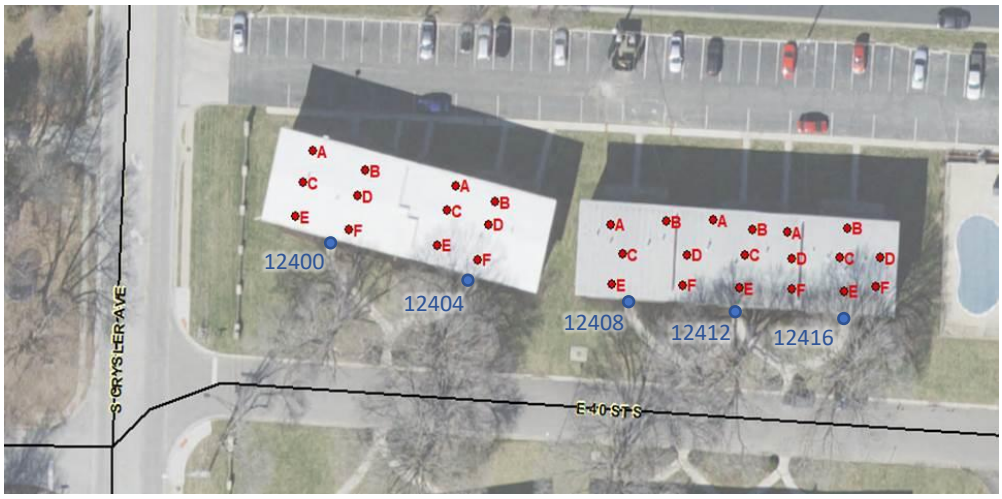


Figure 15-7 Multiple addresses within a single structure, sharing a common entrance

Some 9-1-1 applications and CAD software have difficulty with subaddresses. To alleviate this issue, an address point that has only the structure address and no subaddress information can be created and placed at the structure's primary entrance. The address points with subaddress information can then be stacked on it. If subaddresses are not usable in an application, address points with populated subaddress fields can then be easily extracted from the file while still allowing other applications full use of the address points with subaddress information.

Trying to place address points exactly where individual units are located can be resource intensive to research, create, and maintain. Placement at this level of detail should be reserved for locations where knowing that level of detail will be valuable to the responders.

Large buildings may sometimes have multiple entrances with elevators located nearby that only serve specific floors. In these situations, it is important to make sure that address points are stacked at the building entrance associated with the elevator that serves their floor so that responders are directed to the correct entrance.

In rare situations, a structure may be split by a PSAP Boundary or Emergency Service Boundary. In these situations, it is critical that the address points are placed within the corresponding PSAP and Emergency Services Boundaries that services the address. This may not be at the structure entrance.

Multiple Structures and/or Sites that Share the Same Address

Some properties contain multiple structures and/or sites that share the same address and are only differentiated by a number, name, or other unique identifier (e.g., medical campus, mobile home park, correctional facility, campground).

At a minimum, each structure and/or site should have its own Structure address point with subaddress fields populated so that responders can be sent to the correct location. This is especially critical when the property is spilt by a PSAP Boundary or Emergency Service Boundary. Address points must be placed so that calls can be routed to the correct PSAP and the appropriate emergency service providers can be identified.

To assist responders, it is often helpful to create a Property Access address point that contains only the property address (no subaddress information) and place the address point at the primary access to the property, particularly if the property is very large or the CAD software does not recognize subaddresses as unique addresses. If subaddress information is known but one is not able to identify the specific structure and/or site it is associated with, Property Access address points with subaddress information can be stacked on this access point.

In the mobile home park in Figure 15-8 below, there is one separate unnamed driveway where the structures share the same address but have different unit numbers. For example, Lots 1-17 are all addressed as 110 East Canada Street. Structure address points with subaddress information are placed on each structure. A separate

Property Access address point with no subaddress information is placed at the driveway entrance that provide access to their specific units.

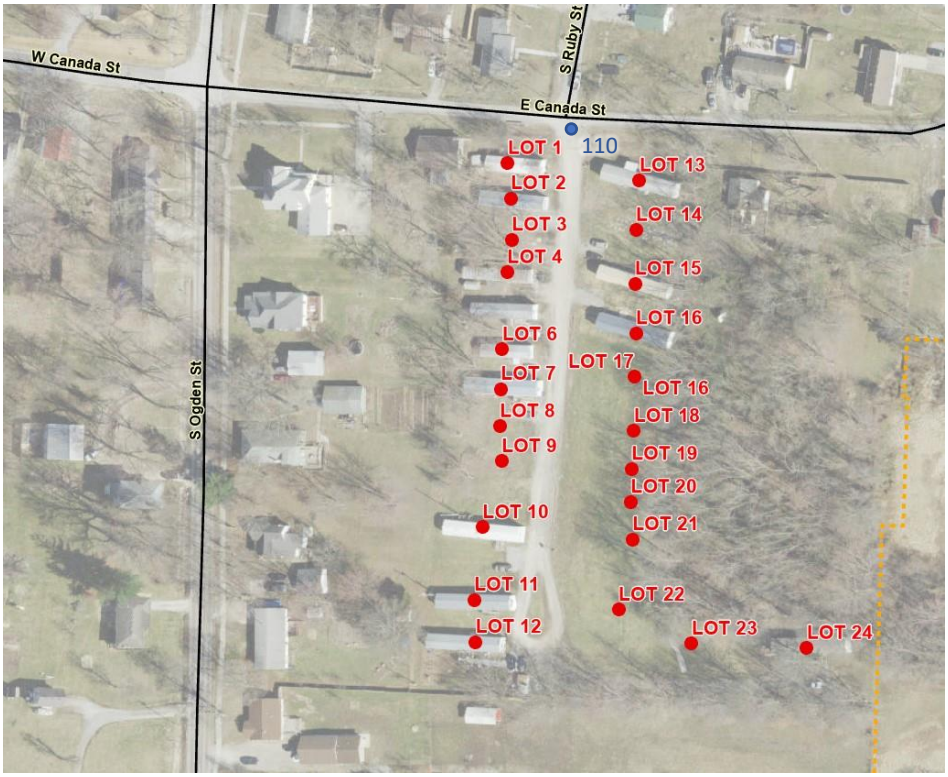


Figure 15-8 Structures share same address but are differentiated by their unit number

On occasion, properties containing multiple structures and/or sites that share the same address and are only differentiated by their subaddress information, may have an administrative building that carries the same address as the other units, but the administrative building does not have subaddress information. Figure 15-9 below shows an example of this situation where all structures are addressed as 2401 West Broadway but are differentiated by their apartment number, with the exception of the administrative building. It is addressed without any subaddress information.

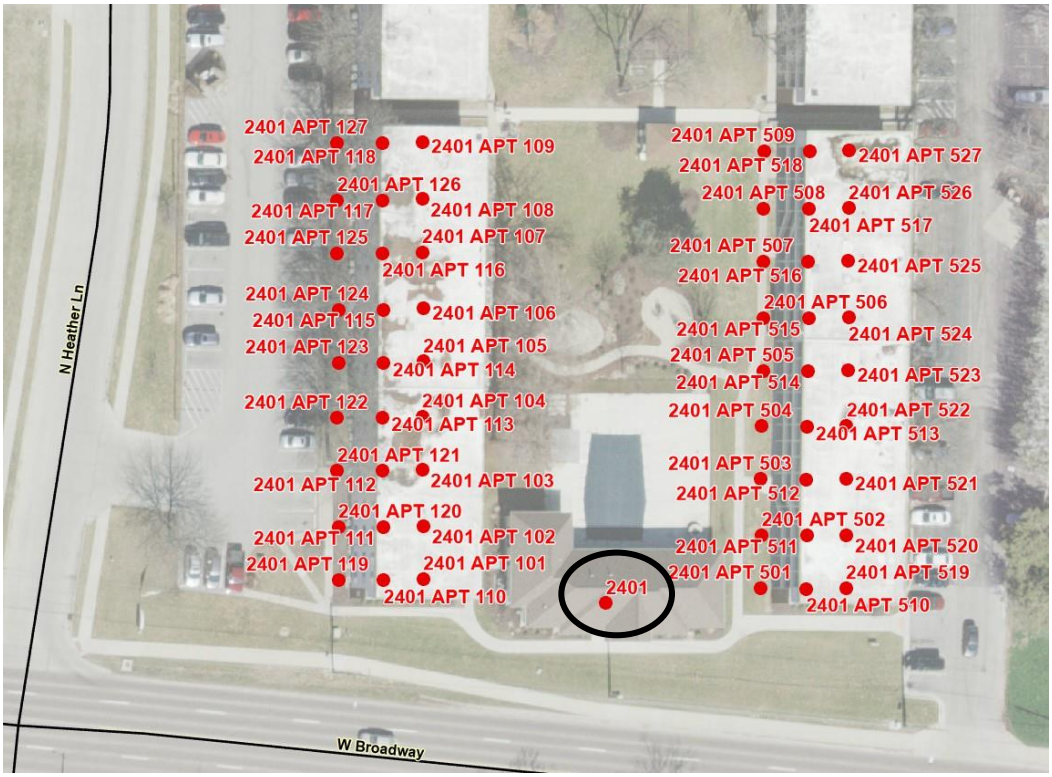


Figure 15-9 Administrative building has same address but no unit number as other subaddressed structures

If the CAD system does not recognize subaddresses as unique addresses, only the Structure address point placed on the administration building will be recognized. For such a situation, consideration should be given to create an additional Property Access address point that contains only the property address (no subaddress information) to represent the access for all units at that location and place the Property Access address point at the primary access to the property.

Multiple Properties Sharing One Address

Large properties assigned a single address may consist of multiple parcels and even span across a road. A Structure address point for the property should be placed on the addressed structure regardless if the address conflicts with the address range odd/even parity on that side of the road. In such a case, the Structure address point would need to be flagged as an exception for Parity Checks during the QC process. If no structure exists on the addressed property, a Parcel address point should be placed on the side of the road that does not conflict with the address range odd/even parity. If there is a driveway or other main access to the property that goes to a specific feature on the property such as a swimming hole or fishing pond, a Property Access address point could be used instead of a Parcel address point.

Transient Structures

Mobile home parks, seasonal camps, and other addressed locations often have temporary structures that can be moved to a different location on the addressed property or be removed entirely from the property. For large properties where the temporary structure is moved frequently, a Property Access address point should be placed at the access to the property or, if there is no primary access to the property, a Parcel address point should be used.

For small areas or areas where the temporary structure is usually located when it is on the property (e.g. mobile home park, campsite), the address point can be placed where the transient structure would normally be located. To minimize maintenance of the Placement Method attribute for such situations, populate Placement Method as “Site” if the address contains subaddress information (e.g., Lot #, Unit #, etc.) and “Parcel” if there is only one address for the property. This avoids having to constantly update the record when the temporary structure is removed from the property.

15.4 Location Markers

Mile posts, trail head marker, trail intersection markers, and other location markers provide a valuable reference for 9-1-1 callers when a civic address location is unavailable. If these locations will used for call routing purposes, they can be represented as an address point in the Site/Structure Address Points dataset by populating the Mile_Post field instead of, or in addition to, the Address Number fields. Alternatively, they can be placed in a Mile Marker layer that can be referenced by the telecommunicator. This is a recommended layer in the NENA Standard for NG9-1-1 GIS Data Model [1], but it is not used for the Emergency Call Routing or Location Validation Functions. Development and maintenance of these features and their associated layers is an important consideration when deciding how to represent them in the NG9-1-1 GIS data.

15.5 Military Bases

Military bases may or may not have their own PSAP and responsibility for emergency services. In most cases, they will share street name information with the local 9-1-1 jurisdiction but may not provide address specific information. It is recommended that the local 9-1-1 jurisdiction reach out to the military facility and work directly with them to obtain the most current information they are willing to provide. Some may share their address information but restrict usage for 9-1-1 operations only, not allowing the data to be publicly shared.

Local 9-1-1 jurisdictions having difficulties obtaining address information from military bases should reach out to the Missouri 9-1-1 Services Board for contact information (https://www.missouri911.org).

16 Items Pending Future Work

The following items require additional research and/or development work:

- Development and maintenance of domains used within Missouri
- Determine Discrepancy Agency Identifier values that will be standardized at the state level in conjunction with the NG Core Service provider
- Development of an Alias Street Names table
- Develop consistent naming/addressing convention for:
    - Crossover/connector roads on controlled-access highways
    - Rest areas, service plazas and their buildings on controlled-access highways
    - On and off ramps to rest areas and service plazas
- Develop a best practice for road names on roundabouts and traffic circles
- Create a list of standardized QC exception codes and descriptions level in conjunction with the NG Core Service provider
- Minimum metadata elements required with local data submission and whether metadata should be on the data or in a separate file
- Discuss data sharing and add language to the Missouri GIS Data Standard and Best Practices once a policy is in place.
- Monitor changes to the NENA Site/Structure Address Point Placement Method Registry [17]
- Monitor changes to NENA Civic Location Data Exchange Format (CLDXF) [12]
- Monitor changes to NENA Standard for NG9-1-1 GIS Data Model [1]
- Monitor work and output of NENA 3D GIS workgroup

17 Terminology

Unless otherwise noted, the following terms are a subset of terms defined in the NENA Master Glossary of 9-1-1 Terminology [14] or the NENA Standard for NG9-1-1 GIS Data Model [1].

Term or Abbreviation	Definition / Description
Addressing Authority	An Addressing Authority is a local, military, or county department responsible for issuing addresses and reconciling addressing discrepancies, through administrative procedures, to locations within its jurisdiction. The local and county authority is provided by state statute for the specific purpose of aiding in fire protection, emergency services, and civil defense.
ALI (Automatic Location Identification)	The automatic display at the PSAP of the caller's telephone number, the address/location of the telephone and supplementary emergency services information of the location from which a call originates.
BCF (Border Control Function)	Provides a secure entry into the ESInet for emergency calls presented to the network. The BCF incorporates firewall, admission control, and may include anchoring of session and media as well as other security mechanisms to prevent deliberate or malicious attacks on PSAPs or other entities connected to the ESInet
CAD (Computer Aided Dispatch)	A computer-based system, which aids PSAP Telecommunicators by automating selected dispatching and record keeping activities.
CLDXF (Civic Location Data Exchange Format)	A United States emergency services profile of PIDF-LO that defines a set of data elements that describe detailed street address information.
Data Domain	An enumerated listing or range of valid values that may be used as an attribute. If no Data Domain is provided, then any value that meets the format criteria may be used.
DHCP (Dynamic Host Configuration Protocol)	A widely used configuration protocol that allows a host to acquire configuration information from a visited network and, in particular, an IP address.
DNS (Domain Name System)	A globally distributed database for the resolution of host names to numeric IP addresses.
ECRF (Emergency Call Routing Function)	A functional element in an NGCS (Next Generation 9-1-1 Core Services) which is a LoST protocol server where location information (either civic address or geo-coordinates) and a Service URN serve as input to a mapping function that returns a URI used to route an emergency call toward the appropriate PSAP for the caller's location or towards a responder agency.
ESInet (Emergency Services IP Network)	A managed IP network that is used for emergency services communications, and which can be shared by all public safety agencies. It provides the IP transport infrastructure upon which independent application platforms and core services can be deployed, including, but not restricted to, those necessary for providing NG9-1-1 services. ESInets may be constructed from a mix of dedicated and shared facilities. ESInets may be interconnected at local, regional, state, federal, national and international levels to form an IP-based inter-network (network of networks). The term ESInet designates the network, not the services that ride on the network.

Term or Abbreviation	Definition / Description
ESRP (Emergency Service Routing Proxy)	An i3 functional element which is a SIP proxy server that selects the next hop routing within the ESInet based on location and policy. There is an ESRP on the edge of the ESInet. There is usually an ESRP at the entrance to an NG9-1-1 PSAP. There may be one or more intermediate ESRPs between them. • Originating ESRP: The first routing element within the Next Generation Core Services (NGCS). It receives calls from the BCF at the edge of the ESInet. • Terminating ESRP: The last ESRP for a call in NGCS.
GCS (Geocode Service)	A web-based i3 service that provides two functions: Geocoding and reverse-geocoding. Geocoding takes a PIDF-LO, which contains a civic address and returns a PIDF-LO containing a geodetic representation for the same location; reverse-geocoding takes a PIDF-LO, which contains a geodetic representation and returns a PIDF-LO that contains a civic address for the same location.
i3	A shorthand term for a version of a NENA technical architecture that introduces the concept of an Emergency Services IP network (ESInet), which is designed as an IP-based inter-network (network of networks) shared by all agencies which may be involved in any emergency. An interim version of the NENA E9-1-1 architecture evolving to an IP infrastructure is referred to as 'i2'.
LoST (Location-to-Service Translation) Protocol	A protocol that takes location information and a Service URN and returns a URI. Used generally for location-based call routing. In NG9-1-1, used as the protocol for the ECRF and LVF.
LVF (Location Validation Function)	A functional element in an NGCS that is a LoST protocol server where civic location information is validated against the authoritative GIS database information. A civic address is considered valid if it can be located within the database uniquely, is suitable to provide an accurate route for an emergency call and adequate and specific enough to direct responders to the right location.
MCS (MSAG Conversion Service)	A web service providing conversion between Presence Information Data Format-Location Object (PIDF-LO) and Master Street Address Guide (MSAG) data.
MDS (Mapping Data Service)	A service that returns images or features stored in a GIS that can be used to create a display for a telecommunicator or facilitate spatial analyses. Often used to provide maps for handling out of area calls, the Mapping Data Service can also be used locally to provide a single, uniform map display for all functional elements in a PSAP that require maps.
MSAG (Master Street Address Guide)	A database of street names and house number ranges within their associated communities defining Emergency Service Zones (ESZs) and their associated Emergency Service Numbers (ESNs) to enable proper routing of 9-1-1 calls.

Term or Abbreviation	Definition / Description
NENA (National Emergency Number Association)	NENA, also referred to as The 9-1-1 Association, is fully dedicated to the continued improvement and modernization of the 9-1-1 emergency communication system. NENA's approach includes research, standards development, training, education, certification, outreach, and advocacy through communication with stakeholders. As an ANSI-accredited Standards Developer, NENA works with 9-1-1 professionals, public policy leaders, emergency services and telecommunications industry partners, like-minded public safety associations, and more. Current NENA activities center on awareness, documentation, and implementation for Next Generation 9-1-1 (NG9-1-1) and international three-digit emergency communication systems. See www.nena.org.
NG9-1-1 (Next Generation 9-1-1 Services)	A secure, IP-based, open-standards system comprised of hardware, software, data, and operational policies and procedures that (A) provides standardized interfaces from emergency call and message services to support emergency communications; (B) processes all types of emergency calls, including voice, text, data, and multimedia information; (C) acquires and integrates additional emergency call data useful to call routing and handling; (D) delivers the emergency calls, messages, and data to the appropriate public safety answering point and other appropriate emergency entities based on the location of the caller; (E) supports data, video, and other communications needs for coordinated incident response and management; and (F) interoperates with services and networks used by first responders to facilitate emergency response. Ref: Agreed to by NENA, NASNA, iCERT, and the National 9-1-1 Office representatives on 01/12/2018.
NGCS (NG9-1-1 Core Services)	The base set of services needed to process a 9-1-1 call on an ESInet. Includes: • Emergency Services Routing Proxy (ESRP) • Emergency Call Routing Function (ECRF) • Location Validation Function (LVF) • Boarder Control Function (BCF) • Bridge • Policy Store • Logging Services • Domain Name System (DNS) • Dynamic Host Configuration Protocol (DHCP) The term NG9-1-1 Core Services includes the services and not the network on which they operate.
PIDF-LO (Presence Information Data Format – Location Object)	Provides a flexible and versatile means to represent location information in a SIP header using an XML schema.
Policy Store	A functional element in the ESInet that stores policy documents/rules.

Term or Abbreviation	Definition / Description
PSAP (Public Safety Answering Point)	An entity responsible for receiving 9-1-1 calls and processing those calls according to a specific operational policy. Variations: • Primary PSAP: A PSAP to which 9-1-1 calls are routed directly from the 9-1-1 Control Office. • Secondary PSAP: A PSAP to which 9-1-1 calls are transferred from a Primary PSAP. • Alternate PSAP: A PSAP designated to receive calls when the primary PSAP is unable to do so. • Consolidated PSAP: A facility where multiple Public Safety Agencies choose to operate as a single 9-1-1 entity. • Legacy PSAP: A PSAP that cannot process calls received via i3-defined call interfaces (IP-based calls) and still requires the use of CAMA or ISDN trunk technology for delivery of 9-1-1 emergency calls. • Serving PSAP: The PSAP to which a call would normally be routed. • NG9-1-1 PSAP: This term is used to denote a PSAP capable of processing calls and accessing data services as defined in NENA's i3 specification, NENA NENA-STA-010, and referred to therein as an "i3 PSAP".
Registry	A single place for keeping valid data values associated with a specific data element.
SI (Spatial Interface)	A standardized NG9-1-1 interface between the GIS data and the functional elements that consume GIS data, such as the ECRF/LVF, Map Database Services, etc.
Street Naming Authority	A Street Naming Authority is the local, military, or county department responsible for approving or issuing street names and reconciling street name discrepancies, through resolution or ordinance, to public streets and private driveways within its jurisdiction. The local and county authority is provided by state statute for the specific purpose of aiding in fire protection, emergency services, and civil defense.
URI (Uniform Resource Identifier)	An identifier consisting of a sequence of characters matching the syntax rule that is named <URI> in RFC 3986 [3]. It enables uniform identification of resources via a set of naming schemes. A URI can be further classified as a locator (URL), a name (URN), or both. A Uniform Resource Locator (URL) is a type of URI that provides a means of locating the resource by describing its primary access mechanism (e.g., its network "location"). An example of a URI that is neither a URL nor a URN is sip:psap@example.com.
URN (Uniform Resource Name)	A type of URI (Uniform Resource Identifier). URNs are intended to serve as persistent, location-independent, resource identifiers and are designed to make it easy to map other namespaces (which share the properties of URNs) into URN-space. An example of a URN is urn:service.sos.
WGS 84 (World Geodetic System 1984)	The reference coordinate system used by the Global Positioning Systems and in cartography and navigation.

18 References

[1] National Emergency Number Association. *NENA Standard for NG9-1-1 GIS Data Model.* NENA-STA-006.1.1-2020. Arlington, VA: NENA, approved February 18, 2020.

[2] Internet Engineering Task Force. *Domain Names – Concepts And Facilities*. P. Mockapetris. RFC 1034, November 1987.

[3] Internet Engineering Task Force. *Uniform Resource Identifier (URI): Generic Syntax.* T. Berners-Lee, R. Fielding and L. Masinter. RFC 3986, January 2005.

[4] World Wide Web Consortium (W3C). *XML Schema Part 2: Datatypes Second Edition*. P. Biron and A. Malhotra. http://www.w3.org/TR/xmlschema-2, October 28, 2004.

[5] United States Postal Service. "Postal Addressing Standards." Publication 28, June 20210. Accessed September 25, 2020.

[6] United States Postal Service. "City State Product," Available at https://postalpro.usps.com/address-quality/city-state-product. Accessed September 25, 2020.

[7] InterNational Committee for Information Technology Standards (INCITS). *Codes for the Identification of Counties and Equivalent Areas of the United States, Puerto Rico, and the Insular Areas.* INCITS 31:2009 (R2019), approved November 2019. Maintained by the U.S. Census Bureau.

[8] Internet Engineering Task Force. *Location Types Registry.* H. Schulzrinne and H. Tschofenig. RFC 4589, July 2006.

[9] Internet Engineering Task Force. *Domain Names – Implementation and Specification*. P. Mockapetris. RFC 1035, November 1987.

[10] Internet Engineering Task Force. *vCard Format Specification*. S. Perreault. RFC 6350, August 2011.

[11] National Emergency Number Association. *NENA Detailed Functional and Interface Standards for the NENA i3 Solution*. NENA-STA-010.2-2016 (originally 08-003), Appendix B. Arlington, VA: NENA, approved September 10, 2016.

[12] National Emergency Number Association. *NENA Next Generation 9-1-1 (NG9-1-1) United States Civic Location Data Exchange Format (CLDXF) Standard.* NENA-STA-004.1.1-2015. Arlington, VA: NENA, approved August 14, 2015.

[13] National Emergency Number Association. *NENA Information Document for Development of Site/Structure Address Point GIS Data for 9-1-1.* NENA-INF-014.1-2015. Arlington, VA: NENA, approved September 18, 2015.

[14] National Emergency Number Association. *NENA Master Glossary of 9-1-1 Terminology*. NENA-ADM-000.23-2020. Arlington, VA: NENA, approved January 20, 2020.

[15] National Emergency Number Association. *NENA Street Name Pre Types and Street Name Post Types Registry* Street Name Pre Types and Street Name Post Types (nena.org). Created March 23, 2014

[16] National Emergency Number Association. *NENA Street Name Pre Type Separators Registry* Street Name Pre Type Separators (nena.org). Created March 23, 2014.

[17] National Emergency Number Association. *NENA Site/Structure Address Point Placement Method Registry* Site/Structure Address Point Placement Method Registry (nena.org). Created June 16, 2018

[18] University of Missouri Structures Project. msdis-archive.missouri.edu - /archive/Missouri_Vector_Data/Facilities_Structures/Missouri_Structures_Project/

[19] University of Missouri - Missouri County Map Books. https://msdis-archive.missouri.edu/archive/MSDIS_Misc_Data/MissouriCountyMapbooks/