



Report on

Addressing Guide 'Best Practices' Document Version 2.0

Prepared for

The State of Michigan

September 2012 ©

L.R. Kimball®
TARGETED RESULTS. EXPERTLY MANAGED.
WE STAKE OUR REPUTATION ON IT.

A CDI Company



ARCHITECTURE • ENGINEERING • COMMUNICATIONS TECHNOLOGY
 AVIATION | CIVIL | CONSTRUCTION SERVICES | DATA SYSTEMS | ENVIRONMENTAL
 FACILITIES ENGINEERING | GEOSPATIAL | NETWORKS | PUBLIC SAFETY | TRANSPORTATION

TABLE OF CONTENTS

REVISION HISTORY	III
INTRODUCTION	1
1. ROAD CENTERLINES	3
1.1 DEVELOPING ROAD CENTERLINES	3
1.1.1 <i>Road Centerline Attribution</i>	4
1.2 ROAD CENTERLINE FIELD STANDARDIZATION	6
1.2.1 <i>Addressing Standards for Road Centerlines</i>	9
1.3 SYNCHRONIZING MSAG AND GIS DATABASES	20
1.4 COMMON CENTERLINE ERRORS.....	21
1.4.1 <i>Centerline Range Concerns</i>	21
1.4.2 <i>Topology</i>	23
1.5 EDGEMATCHING ROAD CENTERLINES ACROSS JURISDICTIONS	25
2. EMERGENCY SERVICE ZONES	29
3. HOUSE NUMBERS	34
4. STRUCTURE POINTS.....	35
4.1 STRUCTURE CENTROID REQUIRED ATTRIBUTION	35
4.2 SYNCHRONIZING STRUCTURE AND ALI DATABASES	35
4.3 COMMON STRUCTURE ERRORS	36
4.3.1 <i>Missing Values</i>	36
4.3.2 <i>Street Name/Street Suffix Errors</i>	36
4.3.3 <i>House Number Errors</i>	36
4.3.4 <i>Legacy Addresses</i>	37
4.4 NO GIS STRUCTURE POINTS.....	37
4.4.1 <i>Hard Copy Addressing Maps</i>	37
4.4.2 <i>GIS Digital Tax Parcel Layer</i>	37
4.4.3 <i>ALI Database</i>	39
4.4.4 <i>USPS Routing Sheets</i>	39
4.4.5 <i>Voter Registration Database</i>	39
4.4.6 <i>Utility Databases</i>	40
4.4.7 <i>Local Municipalities</i>	40
4.4.8 <i>Field Verification</i>	40
5. DATA MAINTENANCE POLICIES	44
6. ADDRESS ORDINANCE.....	46
7. SAMPLE FORMS	47
APPENDIX 1 – ADDRESS GUIDE FLOWCHART	49
APPENDIX 2 – ADDRESS REQUEST FORM.....	50

A CDI Company

APPENDIX 3 – ROAD NAME REQUEST FORM 52

APPENDIX 4 – DATA DISCREPANCY FORM..... 54

APPENDIX 5 – TELEPHONE PROVIDER UPDATE FORM 56

APPENDIX 6 – USPS ADDRESS UPDATE FORM..... 58

APPENDIX 7 – SAMPLE NOTIFICATION LETTERS..... 60

APPENDIX 8 – SAMPLE ORDINANCE..... 63

REVISION HISTORY

Date	Page Number	Requested Changes	By
9/14/12	22	Exception Codes	
9/14/12	25	Edgematching Road Centerlines Across Jurisdictions	
9/14/12	4-5	RDCLASS codes and map symbology	
9/14/12	14-20	Modifications to Street Name and Address Range Development	

INTRODUCTION

The creation and maintenance of quality geographic information system (GIS) based addressing data is in the best interest of each county in the state of Michigan. GIS data is a digital data format that allows information to be collected and edited based on a geographic coordinate system, which allows the data to be spatially accurate with its real-world counterparts. Maintaining this data as current and accurate as possible is essential for correct and expedient emergency call routing. Ideally, at minimum, one or two employees at a local jurisdiction should be familiar with the addressing processes and data maintenance standards for 9-1-1 datasets and should be assigning and maintaining addresses accordingly.

In today's 9-1-1, at a minimum, each county typically creates and maintains the following data layers: street centerlines and emergency service zone (ESZ) boundaries, which shows the response entities for a particular location. For Next Generation 9-1-1 (NG9-1-1), a public safety answering point (PSAP) boundary layer also becomes an important GIS layer for call routing purposes. Creating and maintaining a structure point layer is also highly recommended.

As part of the ENHANCE 911 Act Grant GIS project, this addressing guide is being created to provide local jurisdictions with basic guidelines and best practices for 9-1-1 addressing that will assist in long-term data maintenance planning and establishment of 9-1-1 addressing data maintenance workflows.¹

Although the overall objectives for GIS repository development for the ENHANCE 911 GIS grant project include road centerlines and PSAP boundary GIS layers, this document also includes addressing scenarios that can apply to other GIS layers, such as address structure points and ESZ boundaries. Standard addressing practices for data maintenance of additional layers that exist, such as address structure points and ESZ boundaries, can also affect the road centerline and PSAP boundary datasets.

This report does not contain information for every potential addressing issue, nor will the suggested remediation scenarios apply to every local jurisdiction's situation. For counties with an addressing ordinance, it is recommended that the addressing guidelines that have been established be used to maintain consistency throughout the county. For counties that do not have an addressing ordinance, the information found in this guide should prove helpful. It is also recommended that you check with your Computer Aided Dispatch (CAD) provider for additional data

¹ This document will be updated throughout the course of the project as additional local addressing scenarios are brought up through frequently asked questions. Revisions will be tracked in the revision history on the preceding page.

requirements and specific standards for use within that system, as there may be specifications that do not follow established guidelines.

The National Emergency Number Association (NENA) has published two documents that contain information regarding the maintenance of GIS data – Information Document 71-501 Synchronizing Geographic Information System databases with MSAG & ALI (v 1.1, September 8, 2009) and Document 02-014 GIS Data Collection and Maintenance Standards (Issue 1, July 17, 2007). Both documents should be reviewed and used as a resource.

1. ROAD CENTERLINES

A centerline is a geographic representation of a road, typically designated as a line. A road centerline is given important attribute data that is used for 9-1-1 routing purposes, including road names, ranges, and emergency response information.

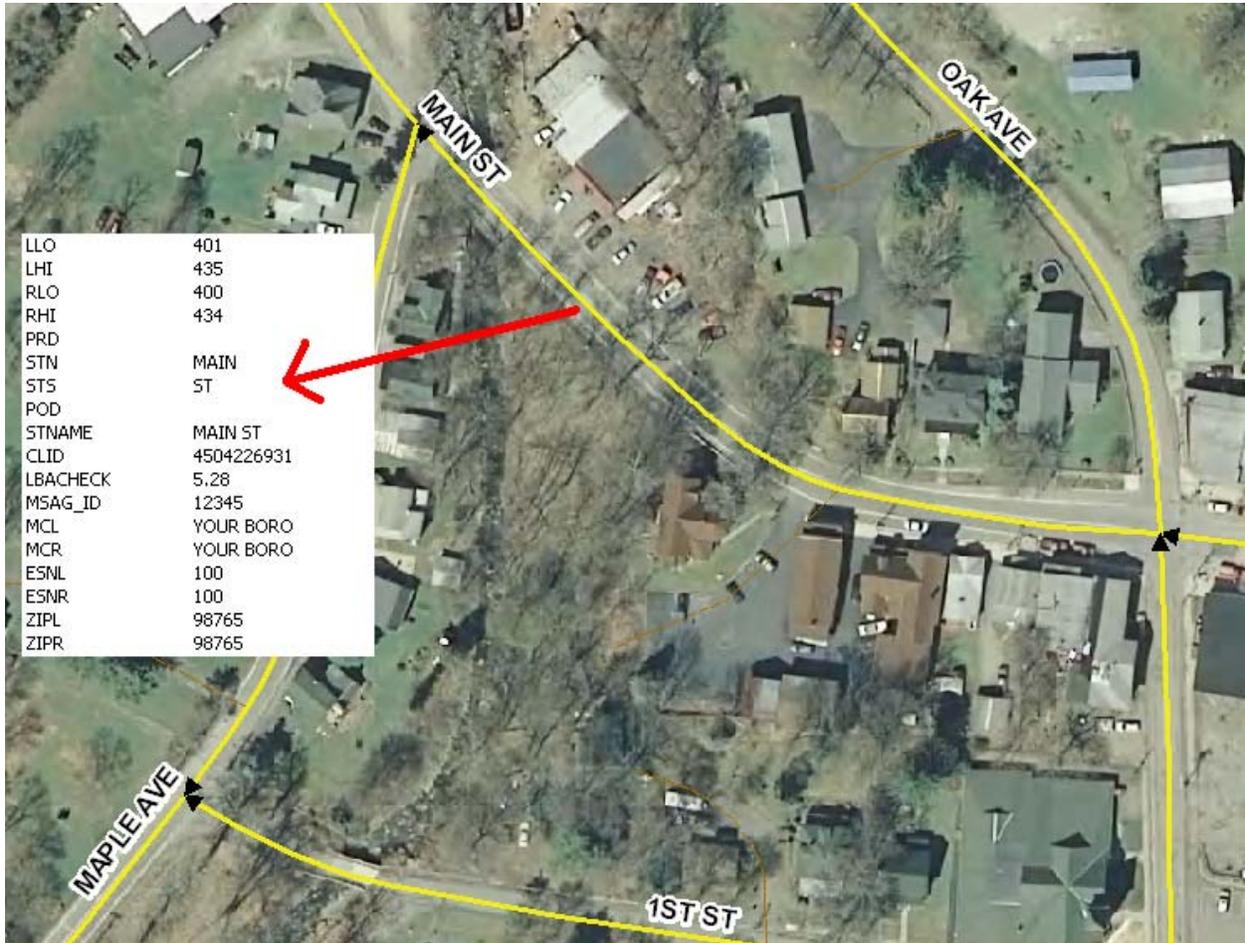


Figure 1 – Sample Centerline File

1.1 Developing Road Centerlines

For 9-1-1, road centerlines can be developed using different methods. In many cases, spatially accurate road centerlines might already exist through another county, state or federal department or agency. These spatially accurate roads can become the base layer for the GIS road centerline addressing information where road names, address ranges and other required fields can be applied to each road segment.

In Michigan, a potential spatially accurate road centerlines source is the GIS roads from the Michigan Geographic Framework (MGF), which is available at no cost from the Center for Shared Solutions and Technology Partnerships (CSSTP). Leveraging this existing data infrastructure could be an effective and efficient means of acquiring an existing road centerline base, which is then used to develop the information for the required addressing fields. MGF data can be downloaded from http://www.michigan.gov/cgi/0,4548,7-158-52927_53037_12693---,00.html.

Where there are no existing spatially accurate road centerline sources available, GIS data collection might be necessary to complete a road centerline base. A typical method for developing spatially accurate centerlines across a jurisdiction is to use an existing known accurate source of digital orthophotography that meets the accuracy standards required for the collection/digitization of road centerlines that are within 10-feet of the center of the roadway.²

A global positioning system (GPS) can be used to collect any roads that might be missing from an existing GIS road centerline source. Mapping-grade GPS units can be used to collect the road geometry in the field and then be downloaded to integrate with the main road centerline map and populated with addressing attribute information. This becomes a typical data collection workflow method for long-term data maintenance.

1.1.1 Road Centerline Attribution

Road centerlines should have, at minimum, the attributes populated that appear in Table 1. These attributes are typically the required NENA addressing fields for today's wireline and wireless calls. It will be critical that, at minimum, these fields are complete and accurate for future call routing in NG9-1-1. The use of the attribution fields established in the Michigan GIS 9-1-1 Database Standards Version 1.0 is available as a template for a local jurisdictions data model.

In addition to the following attributes, the repository requires the RCLID field be populated with a unique value. This attribute allows for a 50 character alpha-numeric value to be populated as determined by the county. If this field is not populated, or not unique, the local data will not be loaded into the repository.

The repository allows for map symbology of the road centerline features to be displayed, providing the RDCLASS field is populated with the appropriate attribution. Framework Classification Codes (FCC) can be used to populate this field. Table 1 shows the accepted values as stated in the Michigan GIS 9-1-1 Database Standards Version 1.0.

² NENA GIS Data Maintenance and Collection Standards, NENA 02-014 page 9.

Table 1 – Typical Road Class (RDCLASS) Attributes

<i>RDCLASS</i>	<i>DESCRIPTION</i>
A1	Limited Access Road
A2	US and State Highways
A3	Local Road
A4	Other Addressable Road
A5	Non-Addressable Roads
A6	Driveways
A7	Trails
A8	Other Non-Addressable Roads
A10	Gated Non-Addressable Roads

Table 2 – Required Addressing Fields for NENA 1.0 Model

<i>FIELD DESCRIPTION</i>	<i>EXAMPLE</i>
Prefix Street Direction	N, E, S, W, NE, NW, SE, SW
Street Name	MAIN, CENTER, ELMWOOD, THIRD
Street Type	ST, AVE, RD
Suffix Street Direction	N, E, S, W, NE, NW, SE, SW
Left From Address	101
Left To Address	149
Right From Address	100
Right To Address	148
MSAG Community Left	GREEN TWP
MSAG Community Right	GREEN TWP
* ESN Left	103
* ESN Right	103
Notes: * ESN – Emergency Service Number representing an Emergency Service Zone (ESZ)	

For the current GIS database repository, it is important for local jurisdictions to begin to include and populate the jurisdictional fields for PSAP, STATE, COUNTY and MUNICIPALITY. This will help to distinguish roads by specific jurisdictions. For example, there could be many road segments with the road name MAIN ST across counties and by populating these jurisdictional values in both the road centerlines and the address structure points it will make data interoperability much easier. These fields are already outlined in the Michigan 9-1-1 Database Standards for the repository and if a jurisdiction's data model does not currently have these fields, they can be added to the local dataset's existing data standards. A jurisdiction can then upload these field values through the repository interface the next time that data is uploaded.

1.2 Road Centerline Field Standardization

To achieve the GIS road centerline required fields standards, some clean up of data might be required for existing road feature records. For example, if a local GIS road centerline layer only has one field for street names that includes the pre-directional, street name, street type and post-directional, then some of the street name components will need to be broken out into their own separate fields to meet the required standards.

Table 3 depicts all street name components included as one field.

Table 3 – All Components in One Field

<i>STREET NAME</i>
W MAIN ST

Table 4 depicts all street name components broken out in standard street name fields.

Table 4 – Components Broken Out

<i>PRD</i>	<i>STN</i>	<i>STS</i>	<i>POD</i>
W	MAIN	ST	

For systems that require the street name information to be all included in one field, the database standards provide an additional field beyond the standards street component fields listed in Table 4. This additional field combines all of the street components into one field. This field can also be useful for labeling within a GIS environment. When records are created and updated, if the full street name field is used, it is important that all fields are updated at the same time to keep the street names across the fields synchronized.

Table 5 depicts the additional field containing the full street name, which can be used for labeling and in other systems.

Table 5 – Additional Field

<i>PRD</i>	<i>STN</i>	<i>STS</i>	<i>POD</i>	<i>FULLSTN</i>
W	MAIN	ST		W MAIN ST

Road centerlines should also contain four separate fields for left and right address ranges. If a road centerline only captures a low and high range without breaking it down to the left and right, some additional data entry will be required to complete the four required fields.

Table 6 depicts a road centerline feature record that only has a low and high range.

Table 6– Low and High Range Feature

<i>LOWRANGE</i>	<i>HIGHRANGE</i>
100	159

Table 7 depicts a road centerline feature record that contains all four standard address range fields.

Table 7 – Standard Address Range Fields

<i>LLO</i>	<i>LHI</i>	<i>RLO</i>	<i>RHI</i>
101	159	100	158

Road centerlines should contain left and right MSAG community and ESN information to distinguish road names and address ranges by the same communities and ESNs that are outlined in the MSAG. The left and right PSAP ID field should be populated, as well as left and right state, county, and municipality fields. Zip code and postal community field values can also be populated as additional reference information. The population of these jurisdictional fields will help with NG911 data interoperability, especially location validation functionality, and the sharing of data between neighboring jurisdictions. In addition, the MSAG community field in the road centerlines should match the community name value used in the MSAG table. This allows for better synchronization and validation between road centerlines and the MSAG and automatic location identification (ALI) database, as described in NENA Information Document 71-501.³ Road centerline features should have both left and right jurisdictional community fields as roads can be a boundary feature whereby address ranges on one side of the street belong to one community and the address ranges on the other side of the street belong to another community. Care should be taken to attribute both sides of the road centerline with the correct addressing information. This includes verifying road names and ranges to maintain consistency and accuracy between jurisdictions. It is recommended that you contact the neighboring PSAP when making changes to shared road centerline features between PSAPs.

The statewide 9-1-1 GIS repository provides the option to upload an MSAG when you upload your road centerlines. This will allow users to continue to check GIS road names against MSAG road names and GIS address ranges against the ranges in the MSAG.

³ NENA Information Document for Synchronizing Geographic Information System databases with MSAG and ALI, NENA 71-501, Version 1.1, September 8, 2009

Figure 2 shows an example of a shared road centerline feature.

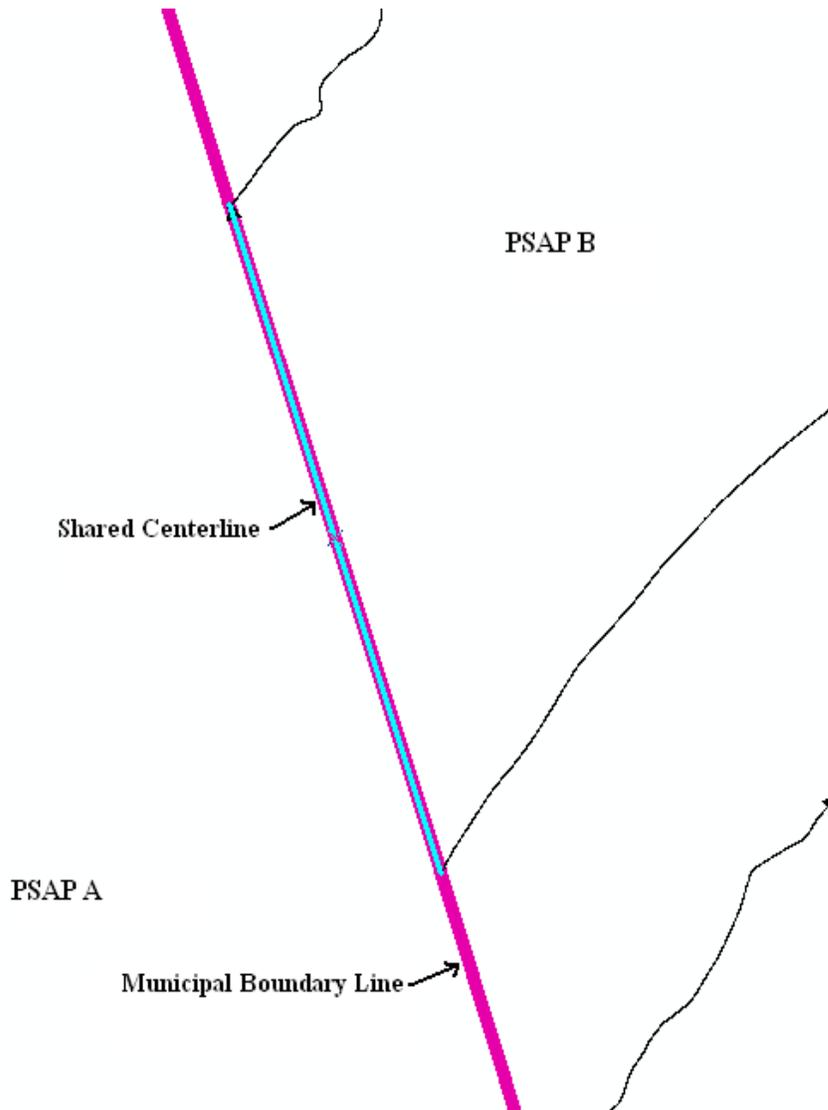


Figure 2 – Example of a Shared Feature

Road centerlines should also be split at all MSAG community boundaries and ESZ boundaries. (An ESZ is the geographic area representing an ESN.) This allows road names and address ranges to be split at these boundaries, which will coincide with the MSAG format. It is important that all ESZ and MSAG community boundaries be topologically accurate – all boundaries are snapped to each other preventing 'gaps' or 'overlaps' between polygon boundaries. All roads that share the same geometric boundary as a jurisdictional boundary should snap to the same topology.

Figure 3 depicts a road split at the ESZ boundary, and the ranges and ESN attribute values reflect different geographic areas.

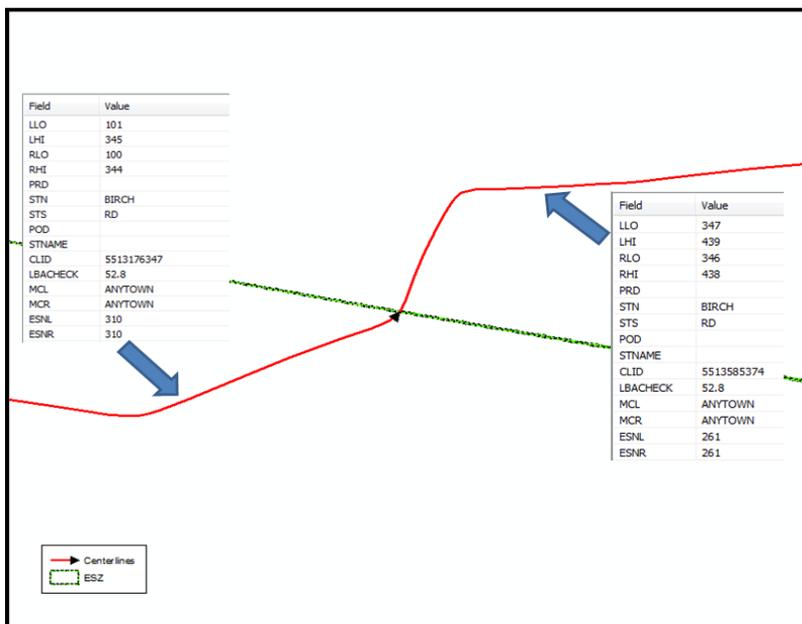


Figure 3 – Road Centerline Split at ESZ Boundary

1.2.1 Addressing Standards for Road Centerlines

In the development of an accurate and standardized road centerline layer, there are a number of considerations and criteria⁴ for the way the actual geometry of the road segment features are developed and how the addressing information is assigned to each road centerline segment. This section provides some basic addressing guidelines that have been introduced over the years as standard approaches to 9-1-1 addressing. Each jurisdiction will have

⁴ NENA Information Document for Synchronizing Geographic Information System databases with MSAG and ALI, NENA 71-501, Version 1.1, September 8, 2009, pages 17-18

unique circumstances for addressing and not all of these standards can be implemented or implemented across all portions of a jurisdiction. Again, these are guidelines. Typically, a jurisdiction will have an address ordinance depicting how addresses should be assigned within the jurisdiction.

1.2.1.1 Line Direction

As a general rule, addresses should increase from low to high. The low addresses should be at the “from node” and the high addresses should be at the “to node” of a centerline segment. The assignment of addresses will be outlined within the local address ordinance. Some examples for the direction of addressing include: addresses increasing sequentially across a jurisdiction from south to north and west to east, and addresses increasing sequentially out from a center grid point within a jurisdiction.

Figure 4 depicts the From and To node designations.

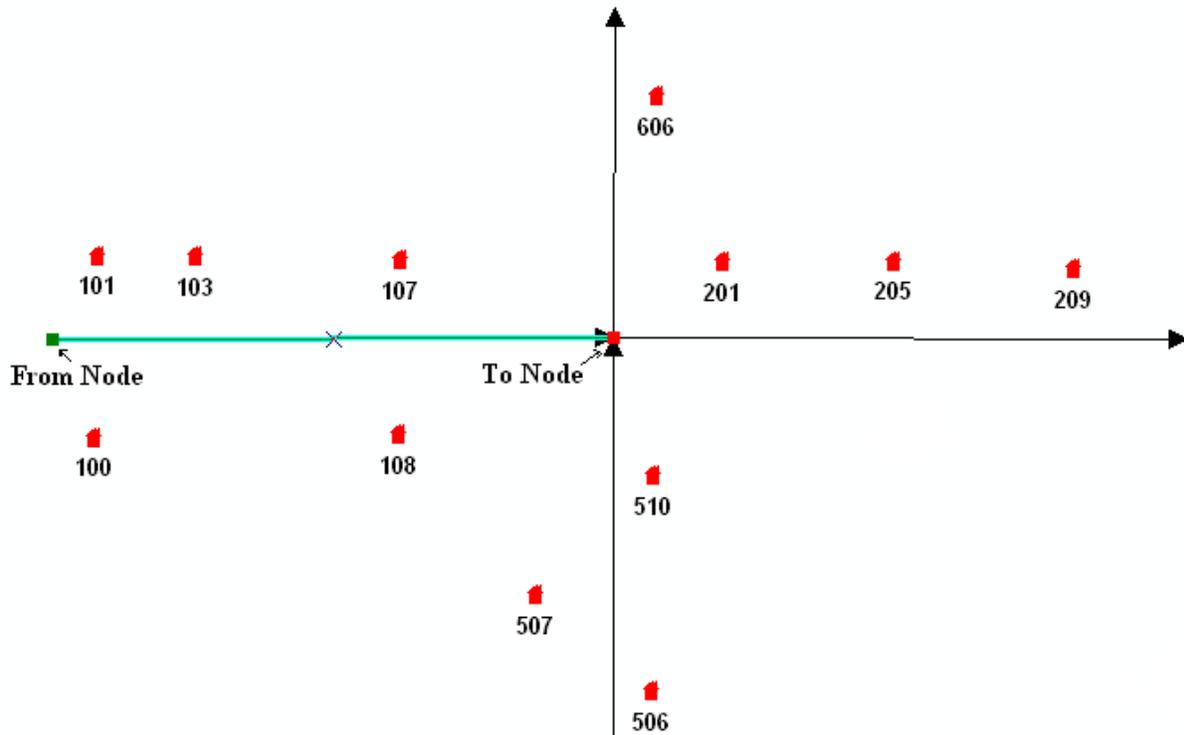


Figure 4 – From Node and To Node

The remainder of this page intentionally left blank.

For dead-end streets and cul-de-sacs, addresses should increase from the intersection with the access road to the dead-end.

Figure 5 depicts an example of addresses increasing from the start of the new road. In this example, road ranges would begin with 100 and 101.

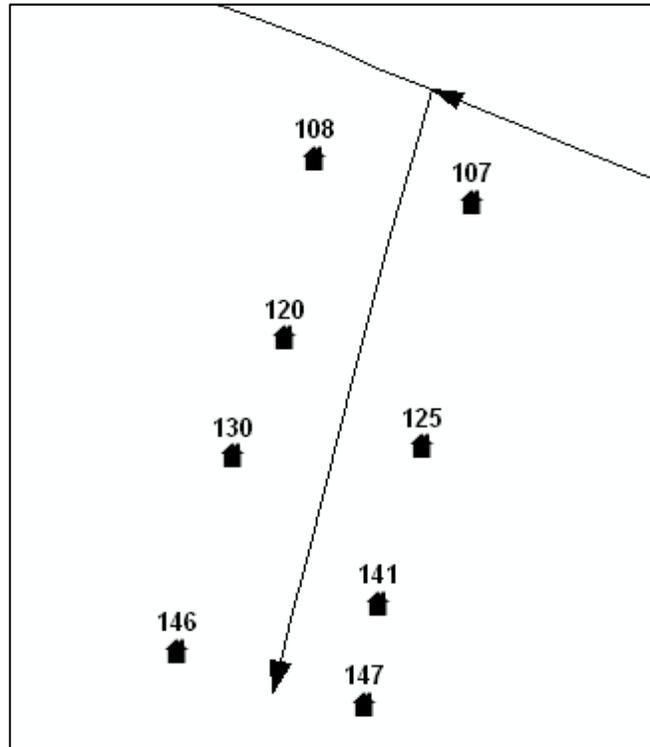


Figure 5 – Addresses from Start of New Road

The remainder of this page intentionally left blank.

Road centerlines should be digitized in the direction that the addresses increase along a road. The addresses should be lower near the ‘from’ node and increase towards the ‘to’ node of the road centerline segment.

Figure 6 depicts an example of incorrect and correct address information along the direction of a road. The road direction should be digitized in the direction of increasing addresses.

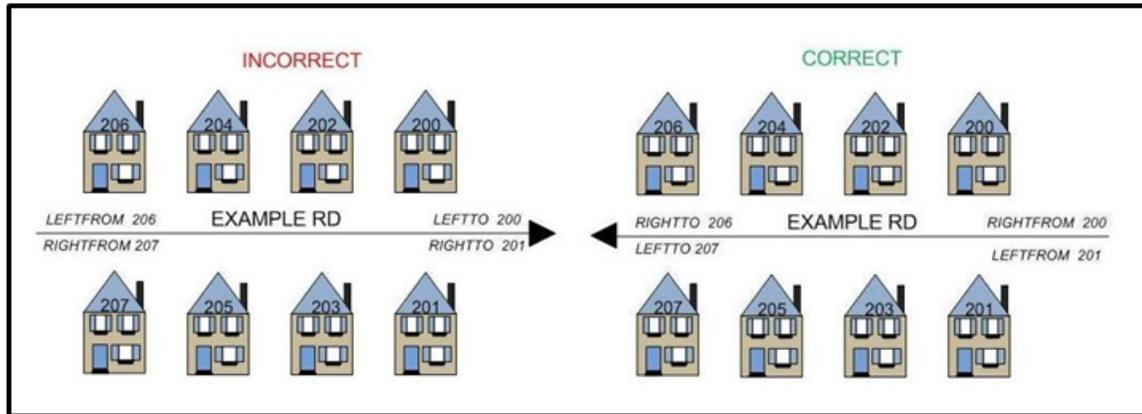


Figure 6 – Incorrect and Correct Address Information

Odd and even addresses should be on the opposite side of the street from the other. The accepted standard is odd value addresses on the left side of the street and even value addresses on the right side of the street when standing at an intersection and facing in the direction of the increasing addresses. Although this is the recommended standard, it is not incorrect if this is not the case in all situations.

Figure 7 depicts even addresses on the right side of the road and odd addresses on the left.

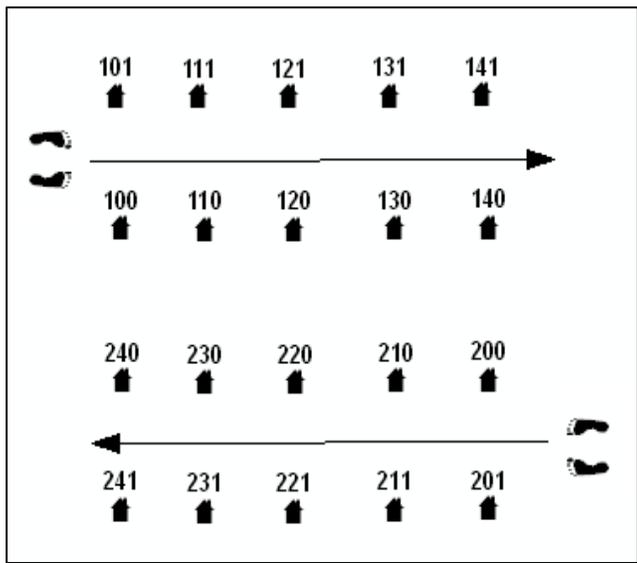


Figure 7 – Even and Odd Addresses

1.2.1.2 Driveways, Non-Addressable Roads and Private Roads

A driveway is a centerline that depicts access to a home. A non-addressable road is typically a road that is visible in orthophotography, but is not named and does not lead to any addressable structures. Examples of non-addressable roads are farm field roads and trails. Neither driveways nor non-addressable roads usually contain a street name or range information. It is recommended that driveways and non-addressable roads be maintained in a layer that is separate from the addressable centerlines layer. Centerlines should not be broken at driveway or non-addressable road intersections. It is recommended that you include an unofficial street name for these non-addressable road centerlines if they are contained as part of your road centerline data and will be uploaded into the repository. Examples of road names you could use in the street name fields are CEMETERY RD or PRIVATE RD. The statewide 9-1-1 GIS repository will flag, through their quality control checks, any roads, addressable or non-addressable that are missing a value in the prime street name field.

Driveways and private roads having two or more addressable structures should be named. This is especially true where driveways are longer than 250 feet or where the structures are not visible from the main road. These scenarios can be addressed as described in this section or as determined by addressing rules and ordinances within a local community.

Figure 8 depicts an example of a driveway with two or more addressable structures, which becomes an addressable road called HIDDEN LN.



Figure 8 – Driveway with Multiple Addressable Structures

1.2.1.3 Street Names and Address Range Development

A number of requirements should be reviewed when it comes to the assignment of road names and address ranges to road centerlines. Each road segment should have, at minimum, a street name value in the street name field. Address ranges for a road segment should not have overlapping range values along the same named road. Address ranges should not have all zero ranges, unless it is a unique situation, such as an on-ramp, off-ramp, or non-addressable road. Centerline segments not containing a range (i.e., the left low, left high, right low, and right high values are all zero [0]), will not route properly should the CAD system have the ability to route calls based on location.

Street names should be unique within a municipality and/or United States Postal Service (USPS) zip code. Streets having duplicate or similar-sounding names should be given new names or a unique range should be assigned to each street. This will alleviate potential issues with mail sorting, although emergency response issues may still arise. A unique street suffix (RD, CT and AVE) does not make a street name unique. The same potential issues exist for Green St. and Green Ave. within the same municipality or zip code as they would for Green St. and Green St.

Address numbers should be assigned using a consistent address interval (e.g., every 10.56, 26.4 feet or 52.8 feet). An address interval is the number of possible addresses per one mile length of road. The smaller the interval, the more possible numbers that will be available for use. This allows potential house numbers for future development. Address intervals could vary between urban and rural areas. The majority of counties in Michigan with address ordinances posted on-line use this method with an address interval of 5.28 feet, or 1,000 numbers per mile with 500 numbers on each side of the road. Assigned address numbers should fall within the range of the road centerline

segment from which the driveway is accessed. Address ranges at the beginning of a unique road should not start at zero. Typical ranges start at 1 and 2 or 100 and 101.

In city ‘block-style’ addressing, ranges that allow for actual ranges rather than potential ranges are recommended. This will provide a more accurate geocoded location along a road centerline. ⁵ During the geocoding process, the road centerline segment is divided into equal increments based on the range that has been established for the given road centerline. If the range ends at a much higher value than the last house number on the street, the geocoded location will be skewed.

Figure 9 depicts a street that has been geocoded based on the ranges given.

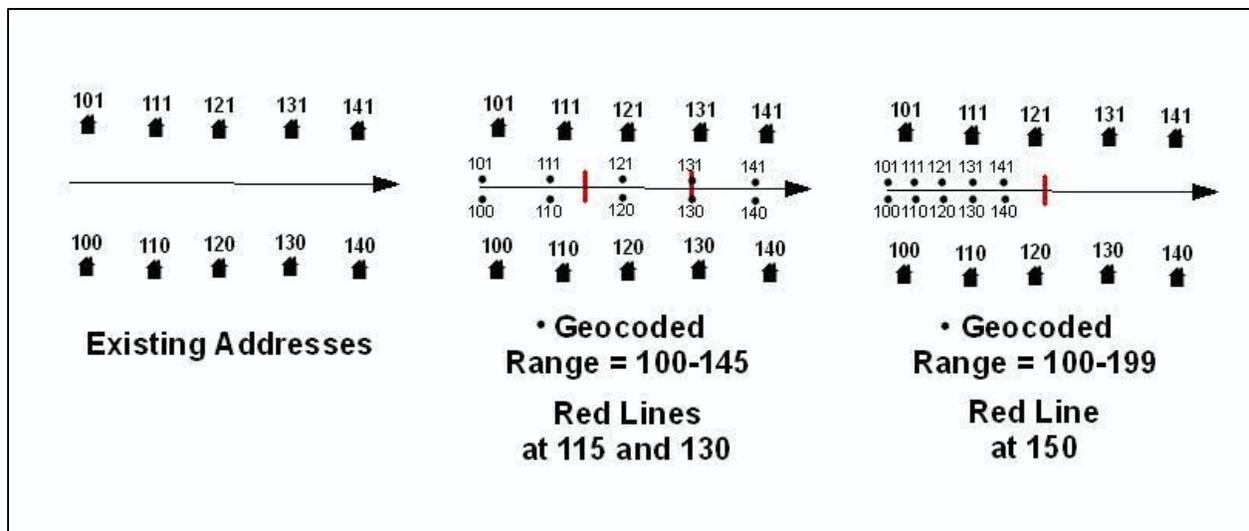


Figure 9 – Example of a geocoded street

When possible, street names and ranges should continue from adjacent municipalities to reduce confusion for travelers, emergency responders, and mail carriers. The road centerline must be broken at the municipal boundary and attributed appropriately. Road centerlines must also be broken at ESZ boundaries and street names and ranges continued.

Figure 10 depicts a road centerline broken at municipality and ESZ boundaries.

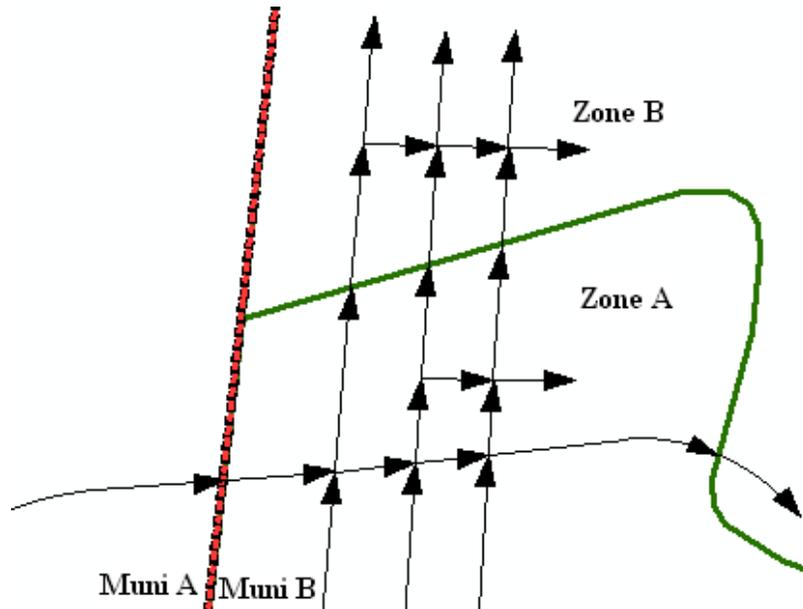


Figure 10 – Centerline Broken at Municipality and ESZ

Divided four-lane highways should be represented with two segments, one for each direction of travel. The outside values should be assigned a range, with the inside values assigned 0 (zero). For interstate values, some CAD systems accept GPS mile marker centroids similar to structure points. Coding the mile marker location in the Interstate centerline is recommended. This is accomplished by splitting a small section of the centerline and assigning that segment the value of the mile marker in the outside ranges (e.g., LLO = 160, LHI = 160, RLO = 0, RHI = 0), while being sure to include the 'N, S, E, W' designation in the post directional field for that centerline. It is permissible to leave the rest of the segments for the interstate coded with 0 (zero) ranges. It is recommended that you discuss the best approach to your local 911 addressing situations with your CAD vendor.

Figure 11 depicts two four-lane highways, with mile marker points designated.

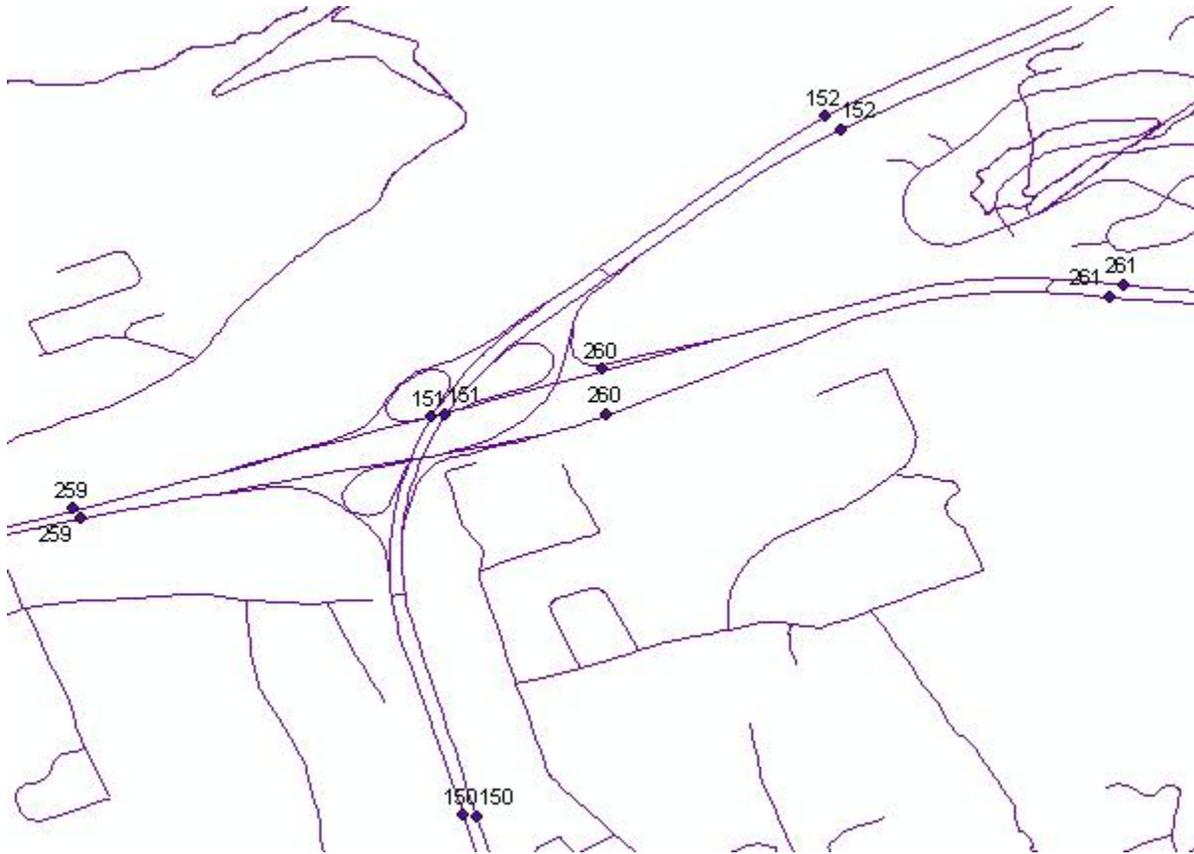


Figure 11 – Limited Access Highways with Mile Markers

Roundabouts, or circular roadway intersections, are typically treated like highway on-ramps and off-ramps. The segments making up the roundabout are assigned the appropriate street name, but are assigned zero ranges and coded with the appropriate exception value. It is recommended that you verify that the assigned addressing will work within the parameters of the CAD system being used by 9-1-1. It is permissible to assign ranges to the segments, providing there are sequential numbers available, but more than likely there will be segments that must be assigned zero ranges within the circle to maintain the integrity of the ranges.

Figure 12 depicts an example of a roundabout.

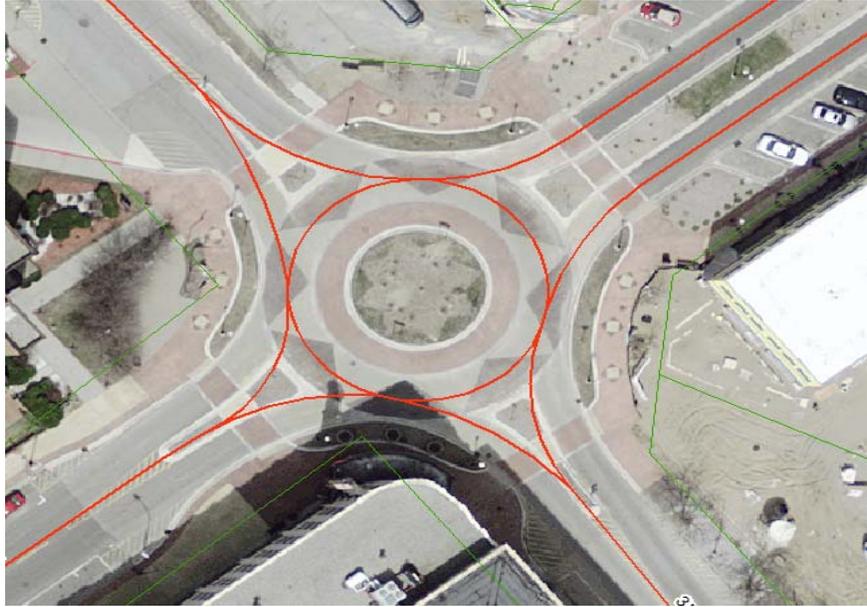


Figure 12 – Example of a Roundabout

Road centerline street suffixes (AVE, ST and RD) should be standardized using USPS Publication 28 to maintain abbreviation consistency.

Table 8 depicts commonly used street suffixes. Added as an appendix is USPS Publication 28, which lists all of the USPS accepted street suffixes.

Table 8 – Common Street Suffixes

<i>ROAD NAME SUFFIX</i>	<i>USPS ABBREVIATION</i>
ALLEY	ALY
AVENUE	AVE
BOULEVARD	BLVD
BYPASS	BYP
CENTER	CTR
CIRCLE	CIR
CREST	CRST
COURT	CT
COVE	CV
DRIVE	DR
EXPRESSWAY	EXPY
EXTENSION	EXT

<i>ROAD NAME SUFFIX</i>	<i>USPS ABBREVIATION</i>
FREEWAY	FWY
HIGHWAY	HWY
LANE	LN
LOOP	LOOP
PARKWAY	PKWY
PIKE	PIKE
PLACE	PL
ROAD	RD
SPUR	SPUR
STREET	ST
TERRACE	TER
TRAIL	TRL
TURNPIKE	TPKE
WAY	WAY

Recommendations for typical road name standardization include the following:

- Entering all road values as upper case, without any leading or trailing spaces before or after values. For example, there should be no extra space after Green in the street name field. Sometimes the space bar can be mistakenly hit and there will be an extra character, 'GREEN_'. This makes some searches difficult because the space could cause a no match. There are some simple commands in GIS and database software to update all characters to upper case and also check for and remove leading or trailing spaces.
- Using numeric values for numbered streets (2nd rather than Second) unless the street is not part of a numbered system (i.e. Second Mile Rd)
- Avoiding special characters and punctuation such as apostrophes, quotes, hyphens or dashes, commas, periods, etc. For example, any roads such as M-35 should be data entered as M 35, using a space rather than a dash.
- Street names should not be abbreviated and should be spelled out. St. Paul Rd should be entered as SAINT PAUL RD. COUNTY ROAD 15 should be spelled out and not be abbreviated to CO RD 15 or COUNTY RD 15.
- For road names that contain two street suffixes, i.e. Main Street Extension, the first suffix should be spelled out and included with the street name, and the second suffix should be abbreviated as the street suffix. For example, Main Street Extension should be Main Street Ext, Deer Path Lane should be Deer Path Ln.
- Special naming conventions exist for cutoffs between two named roads and turnarounds, which are the Michigan left turn lanes between boulevards. The name should be entered using the “from” road, then a slash, then the “to” road, with no street types. For example, E Main/1st.

Although there can always be local nuances and exceptions to road naming conventions, over time it is important to review and adjust road names to existing road naming guidelines. The standardization of road names will improve accuracy and response within today's 9-1-1 environment and especially in a NG9-1-1 environment where other jurisdictions will share or use other local data to assist in response. For example, another jurisdiction could interpret CO to be COMPANY when it is COUNTY or COUNTY when it should be COMPANY. Another example is NO, which could be interpreted as NUMBER or NORTH.

1.3 Synchronizing MSAG and GIS Databases

It is very important that the centerline database and MSAG database match, both by street name and range information, as well as by municipality and ESN information. The MSAG drives the responder designation in response to an emergency call from a wireline phone. Every effort should be made to maintain consistency between these two datasets.

The MSAG is a tabular database that shows a road name, its lowest and highest range values regardless of the number of centerline segments with that name, community name, ESN value, Odd/Even/Both depending on range/community/ESN correlations, and additional fields populated by the telephone company. It is permissible to make corrections to either the centerline database or the MSAG database, as long as both match each other. It is not safe to assume that either the centerline database or the MSAG database will always be correct. Each error needs to be reviewed on an individual basis and the appropriate corrections made to the respective database.

NENA recommendations, outlined in Technical Standard 71-501, call for a 98 percent match rate⁶ between the GIS road centerline and the MSAG to improve overall accuracy of the databases and in preparation for NG91-1. It is important to provide any changes or additions that are made within the MSAG database to the service provider or the 9-1-1 database administrator, who must make the necessary changes as they are presented.⁷

It is important for 9-1-1 to coordinate with their database provider that maintains the MSAG. Any road name changes that need to be made to the MSAG typically need to be made by the database provider. They will need to update the MSAG table as well as the records in the ALI database so the road names match between the two as well as with the GIS road centerline data. It will also be important to assure the timing of moving any changes that might be made in

⁶ NENA Information Document for Synchronizing Geographic Information System databases with MSAG and ALI, NENA 71-501, Version 1.1, September 8, 2009, page 17

⁷ NENA Information Document for Synchronizing Geographic Information System databases with MSAG and ALI, NENA 71-501, Version 1.1, September 8, 2009, page 35

the GIS data to the CAD system to assume that they will be mapped properly when a call comes in, provided the MSAG and ALI databases have been updated. This takes coordination between GIS, 9-1-1, and the database provider, but should be established as a regular workflow or protocol making it an effective long-term update process. In the end, it is this coordination that will truly get the data to, and keep it at, the minimum 98% accuracy levels that is being required by NG9-1-1.

Tables 9 and 10 depict a sample centerline database and the corresponding sample MSAG database. The boxes shown in pink in the MSAG database need to have the corrections shown in red to create a match with the centerline table.

Table 9 – Centerline Database

PRD	NAME	SUFFIX	POD	FRADDL	TOADDL	FRADDR	TOADDR	COMM_L	COMM_R	ESN_L	ESN_R
W	ALMOND	RD		1501	1547	1500	1548	MUNI A	MUNI B	123	456
W	ALMOND	RD		1549	1677	1550	1678	MUNI A	MUNI B	123	456
W	ALMOND	RD		1905	1999	1904	1998	MUNI A	MUNI B	123	456
W	ALMOND	RD		1679	1859	1680	1860	MUNI A	MUNI B	123	456
W	ALMOND	RD		1861	1903	1862	1902	MUNI A	MUNI B	123	456
	BARTON	RD	N	101	941	100	940	MUNI C	MUNI C	987	987
	BARTON	RD	N	943	999	942	998	MUNI C	MUNI C	987	987
	BETTY	ST		1	245	2	246	MUNI D	MUNI D	654	654

Table 10 – MSAG Database

DIR	STREET NAME	POST	LOW	HIGH	MSAG COMMUNITY	ST	E/O/B	ESN	PSAP	EXCH
W	ALMOND RD		1500	1898 1902	MUNI B	MI	E	456	CALL	3140
W	ALMOND RD		1501	1899 1903	MUNI A	MI	O	123	CALL	3140
N delete N	BARTON RD	N	100	999	MUNI A MUNI C	MI	B	987	CALL	3140
	BETTY ST		1	246	MUNI D	MI	B	123 654	CALL	3145

1.4 Common Centerline Errors

It is very rare to find a centerline database that does not contain any errors. The prompt correction of these errors is essential to maintaining an accurate database. All centerline records should contain at minimum, a street name, ranges, community left and right, and ESN left and right values. Records missing these values should be reviewed and populated with the correct values. The best source for determining correct centerline values is an accurate structure point layer. For Counties that have not developed a structure point layer, other valuable source information includes hard copy paper maps, parcel data layers, ALI databases, and field verification. The use of these sources, as well as several other sources, is described in the No GIS Structure Address Points section.

1.4.1 Centerline Range Concerns

All centerline records should contain range values for “From Address Left,” “To Address Left,” “From Address Right,” and “To Address Right” regardless of whether addressable structures exist on the centerline segment. Centerline segments not containing a range will not route properly should the CAD system have the ability to route calls based

on location. There are certain cases where the range values can be zero (0), but in general, whole numbers must be used for these fields. Exceptions include limited access highways, non-addressable roads, and cul-de-sacs where the inside value of the circle is zero. The GIS repository data upload allows Counties to code “exceptions” to the local road centerline database accordingly. Anything coded as an exception will not be shown as an error.

Table 11 shows the Exception Codes currently existing for the State of Michigan repository.

Table 11 – Repository Exception Codes

Exception Code	Exception Description
1	Limited Access Highway Features
2	Driveways or Non-Addressable Feature
3	Legacy Addressing Scenario
4	Local Road Naming Convention
5	Value Falls Outside of Jurisdiction
6	Correction Pending Local Review
7	Overlapping Segment Is Valid

The “From Address” value should be lower than the “To Address” value. Any centerline records where the “From Address” is higher than the “To Address” should be corrected. Most likely, the centerline direction will need to be flipped, as well as all left and right values associated with the record.

To avoid overlapping ranges, the “From Address” of a consequent centerline must show an increase of two from the previous centerline’s “To Address.” For example, if the first section of Sample St ends at 133 and 134, the next section of Sample St must start at 135 and 136. Exceptions to this rule are city-style block ranges, where each block starts at the hundred value, i.e., 100 and 101, then 200 and 201, etc. However, there are no instances where it is acceptable to have overlapping ranges, as this would cause a high risk for addresses to not geocode properly during a 9-1-1 call.

Both odd range values must be either on the left or right side of the centerline, with even values on the opposite side. A mixed range (i.e., Left From Address = 101 and Left To Address = 150) is an error and must be corrected.

For the statewide 9-1-1 GIS repository, if a local jurisdiction has non-addressable roads, and wants to include them in the repository, they should be included in the road centerline layer. They can be coded with an RDCLASS value representing them as a non-addressable road and can be marked as an exception value of 2 so they are not flagged with certain quality control check that do not apply to those types of road segments. There should not be any split of an addressable road at the intersection of a non-addressable or driveway in the road centerline layer.

1.4.2 Topology

It is important to have the correct topology across addressing GIS datasets. Topology is defined as how point, line and polygon features in GIS share geometry, such as the spatial relationships between connecting and adjacent features.⁸ Topology defines and enforces data integrity, such as road centerlines need to be connected together where road segments share an intersection. Another example is where polygon features, such as PSAP boundaries or ESZs, are adjacent to one another; there should be no gaps between the boundaries. Roads that are also a boundary between two jurisdictions should match the same geometry as the jurisdictional boundary.

Common topology errors include dangle errors (overshoots and undershoots), gaps and overlaps, and centerlines not being broken at intersections. Some exceptions include overpasses and underpasses where the centerlines should not be broken. As a general rule, if one cannot access what appears to be an adjoining road at an intersection, the centerlines should not be broken. If non-addressable roads are included in the road centerlines, they should not split an addressable road. There should be no physical breaks along an addressable road where it meets a non-addressable road.

With topology tools, these errors can be flagged for resolution and, in most instances, will need a simple correction. Without topology tools, correcting these errors will be labor intensive and will require reviewing each intersection individually. It is recommended that GIS software for 9-1-1 data maintenance at the local level include topology tools that flag dangles, intersection overlaps and gaps, etc.

The remainder of this page intentionally left blank.

⁸ Dictionary of GIS Terminology, 2001 ESRI Press, page 101

Figure 13 depicts an example of topology dangles where roads are not 'snapped' where they should be to assure connectivity between roads that should be connected.



Figure 13 – Topology Dangles

Figure 14 depicts an example of a road centerline that is not snapped properly at an intersection.

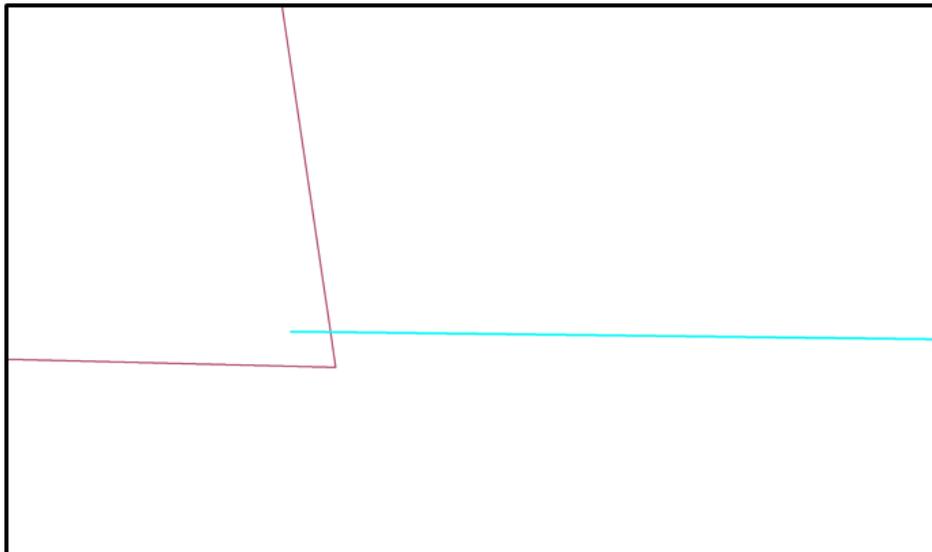


Figure 14 – Improperly Snapped Road Centerline

1.5 Edgematching Road Centerlines Across Jurisdictions

Edgematching road centerlines between neighboring PSAP jurisdictions plays an important role in maintaining the proper spatial consistency of road centerlines that continue across, or are adjacent to, PSAP boundaries. It is very important that neighboring jurisdictions develop good working relationships with each other to coordinate updates or corrections along shared boundaries and feature. This will facilitate the remediation of any areas along the boundary where issues currently exist or develop in the future.

Road centerline segments that extend to the PSAP boundary should be edgematched as closely as possible to the neighboring jurisdiction's road centerline that also extends to the PSAP boundary. If there is a gap between the two segments, neighboring jurisdictions should review their centerline positioning in those instances and make the necessary adjustment to edgematch as close as possible to the neighboring road centerline segment. NENA, in preparing for NG9-1-1, recommends that this become a more common data maintenance process to work with neighboring jurisdictions for shared boundary features, such as road centerline segments that share boundaries and political jurisdictions.

Figure 15 depicts an example of a road centerline that needs to be adjusted.

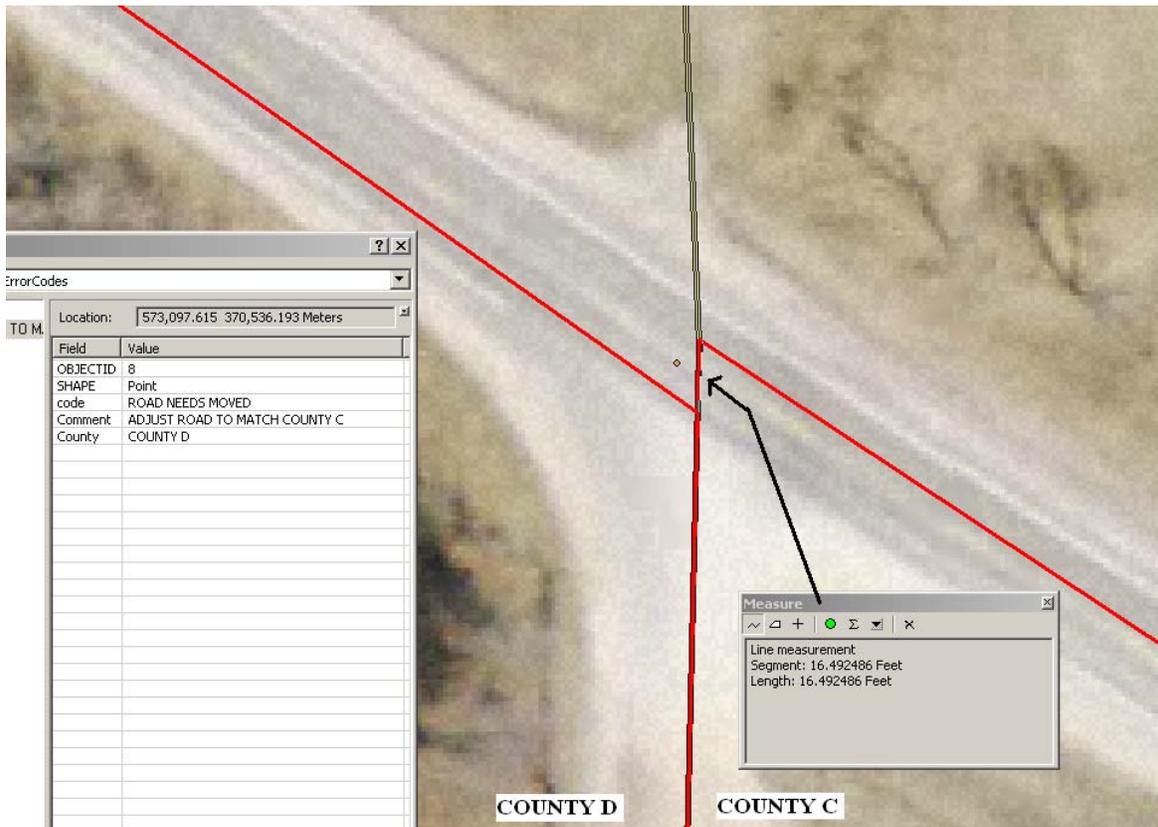


Figure 25 – Example of a PSAP boundary that needs adjusted

The edgematch process within the repository snaps all road centerline segments that are within 10 meters of the PSAP boundary. If a road centerline extends past the PSAP boundary by greater than 10 meters, it will not snap properly to the PSAP boundary. In cases where this occurs, it is recommended that the jurisdiction decrease the distance the road centerline extends past the boundary to within 10 meters.

Figure 16 depicts a road centerline that did not snap to the PSAP boundary.

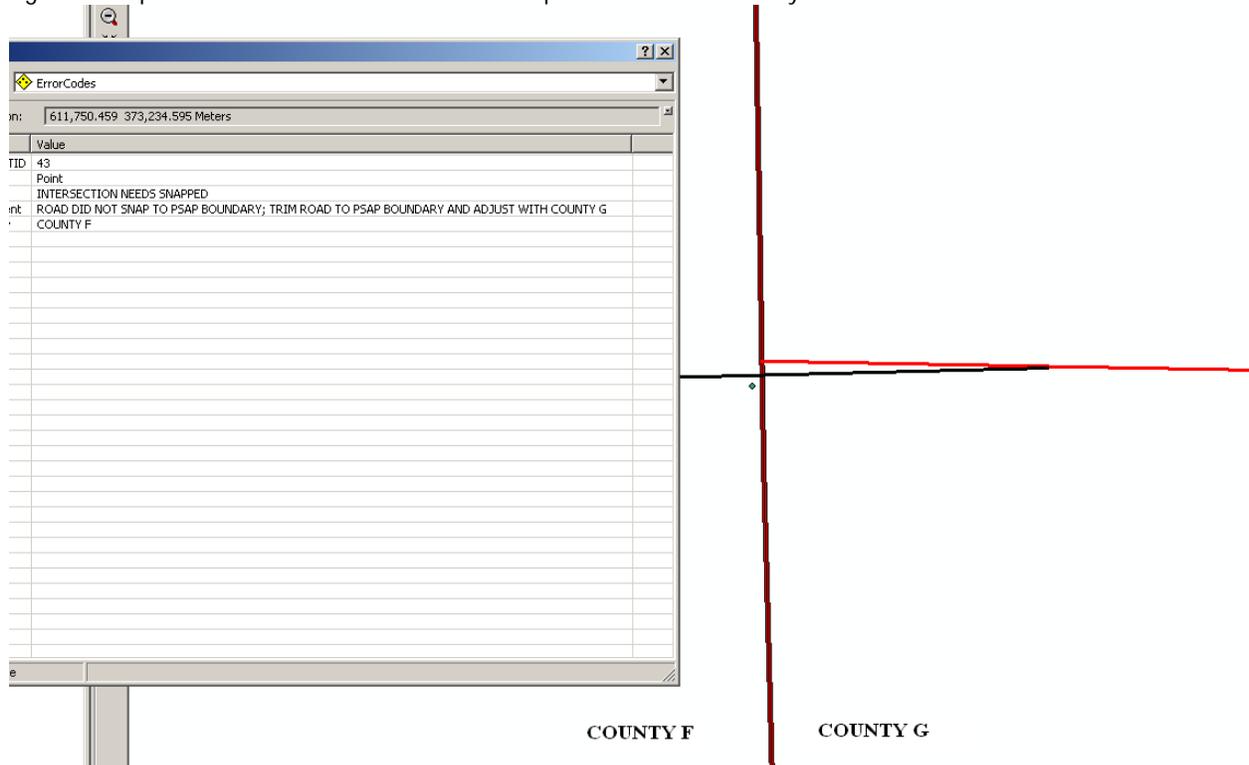


Figure 36 – Example of a PSAP boundary that needs adjusted

For shared boundary edges, only segments that are completely within the 10 meter buffer will be edgematched to the PSAP boundary. Sometimes a road centerline follows a PSAP boundary and then diverts away from the boundary for a distance greater than 10 meters. Where these roads correctly follow a PSAP boundary, it is recommended that the road centerline be split at the PSAP boundary and the ranges adjusted accordingly. It is also important that the left and right road centerline attributes be updated to reflect the correct PSAP entity.

Figure 17 depicts a road centerline that needs to be split at the PSAP boundary.

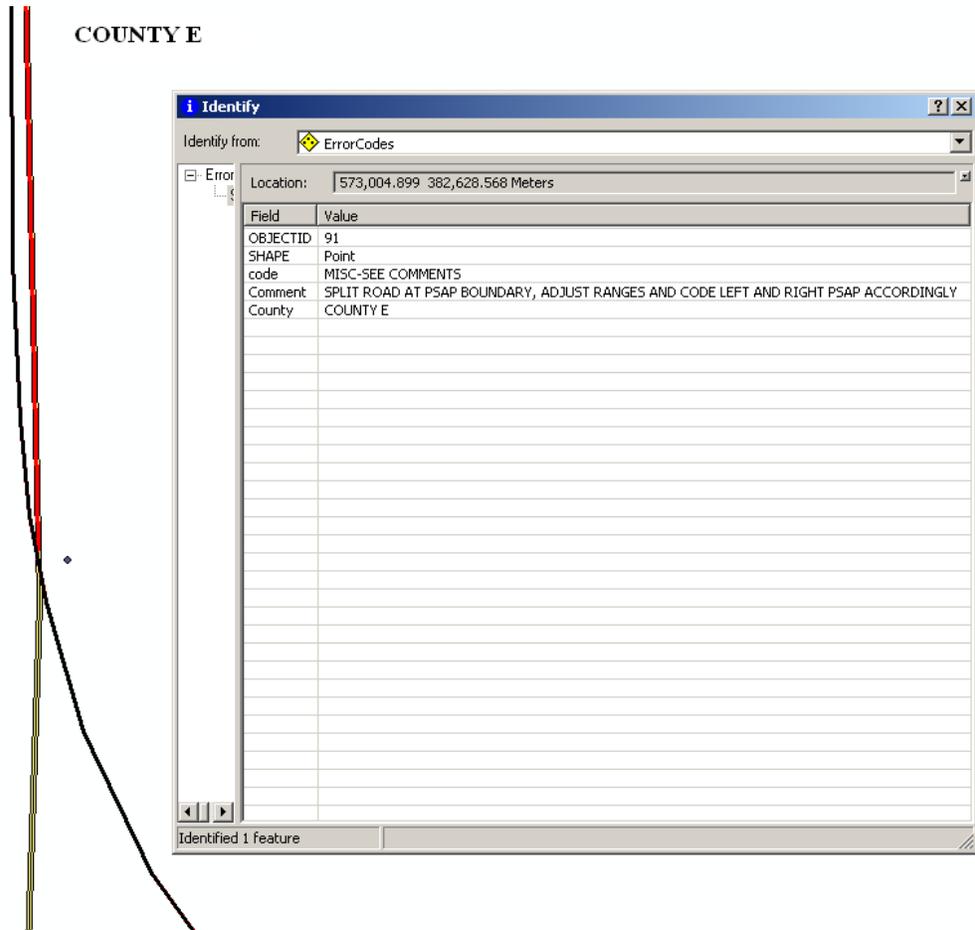


Figure 47 – Example of a PSAP boundary that needs adjusted

There will be some instances where the PSAP boundary should be moved to match the center of the road. In these instances, it will need to be determined if a PSAP boundary can be adjusted based on other jurisdictional boundary locations, such as a county boundary or a municipal boundary.

Figure 18 depicts a PSAP boundary the needs to be adjusted.

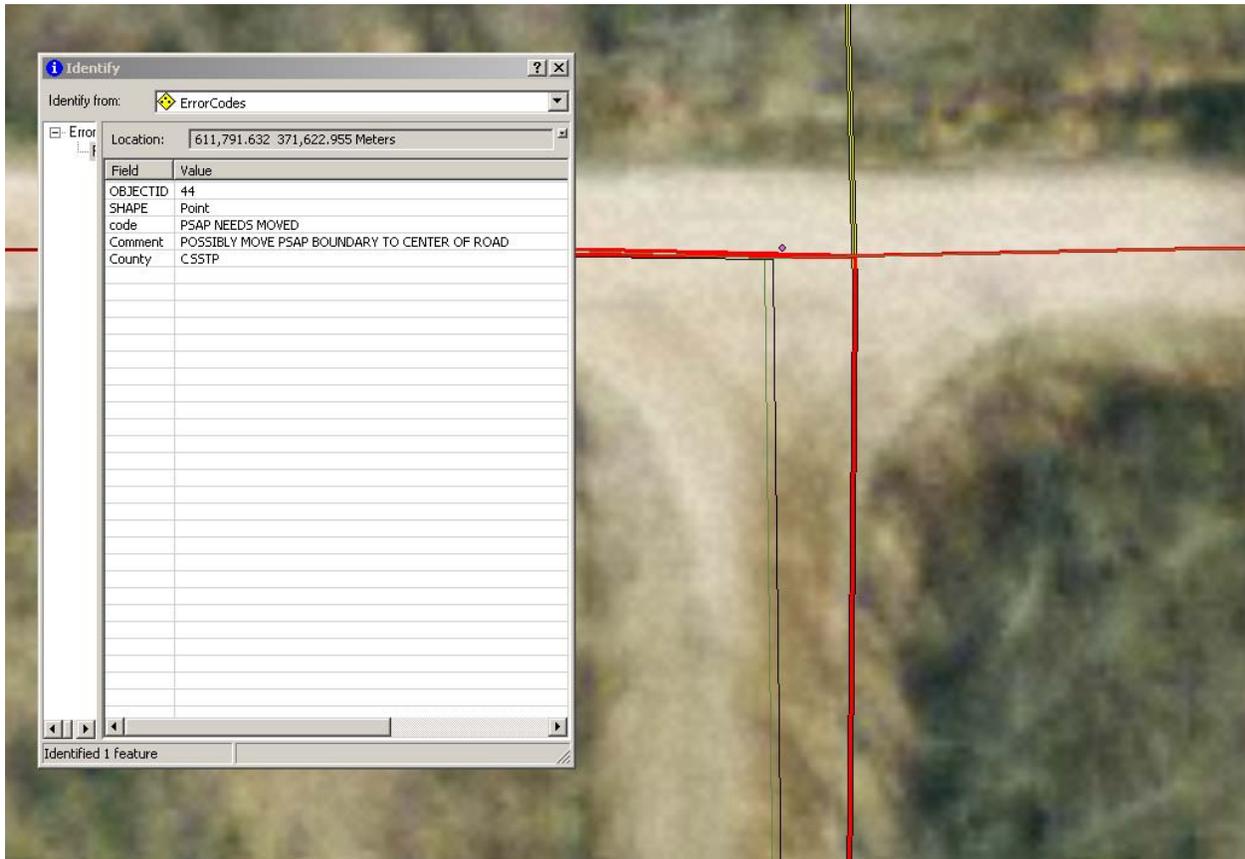


Figure 58 – Example of a PSAP boundary that needs adjusted

2. EMERGENCY SERVICE ZONES

Each County should create an emergency service zone (ESZ) layer that represents the responding emergency providers for a particular area. Depending on the computer aided dispatch (CAD) system requirements, this boundary may be one polygon layer depicting fire, emergency medical services (EMS), and law enforcement responders within each polygon, or it may be three separate layers, one showing fire response polygons, one showing EMS response polygons, and one showing law enforcement response polygons. The creation and maintenance of separate boundary layers for each response entity is recommended. If the CAD system requires one boundary, joining the separate layers prior to importing the data into the CAD system is usually sufficient.

Figure 19 depicts a county broken into fire response boundaries.

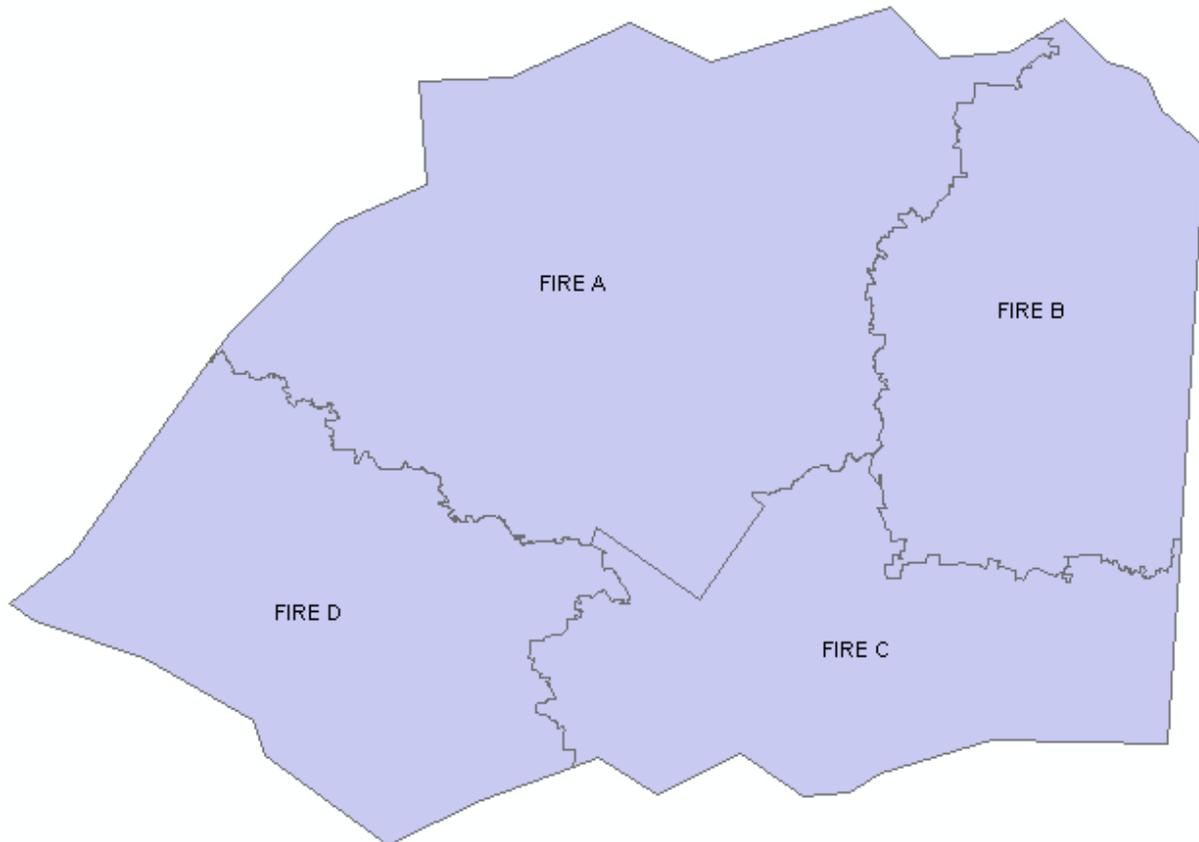


Figure 19- Fire Response Boundaries

Figure 20 depicts a county broken into EMS response boundaries.

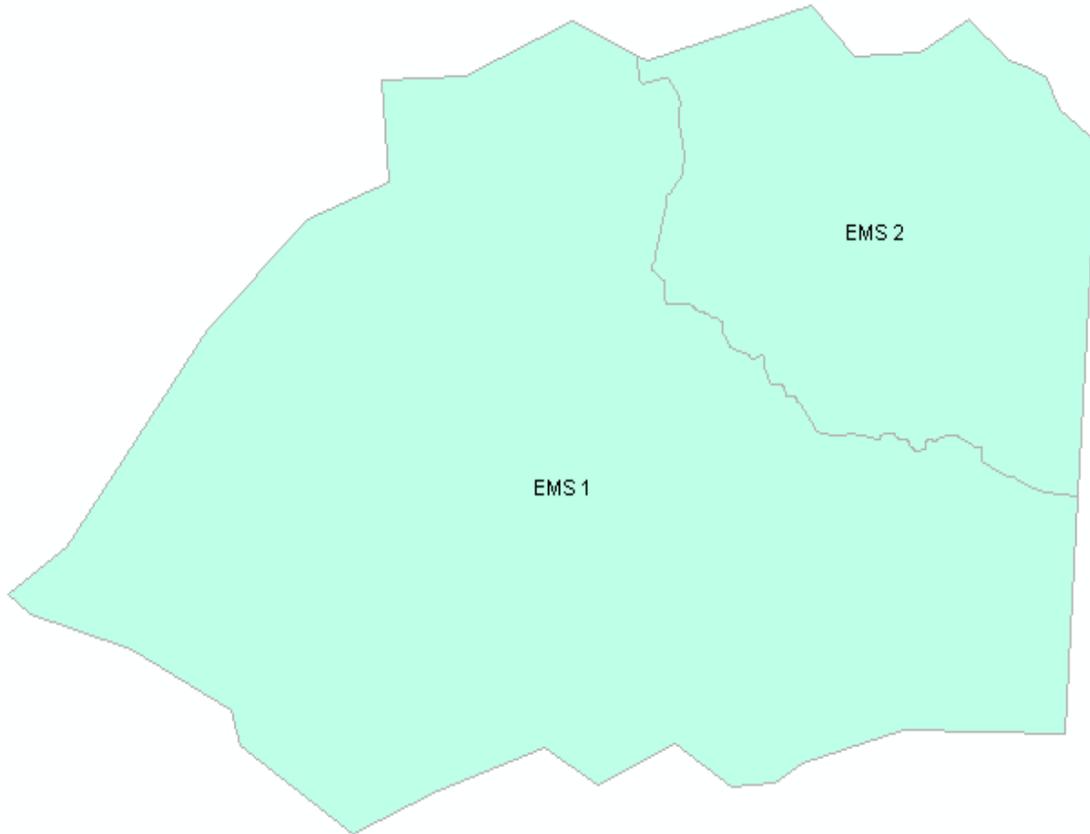


Figure 20 – EMS Response Boundaries

The remainder of this page intentionally left blank.

Figure 21 depicts a county broken into law enforcement response boundaries.

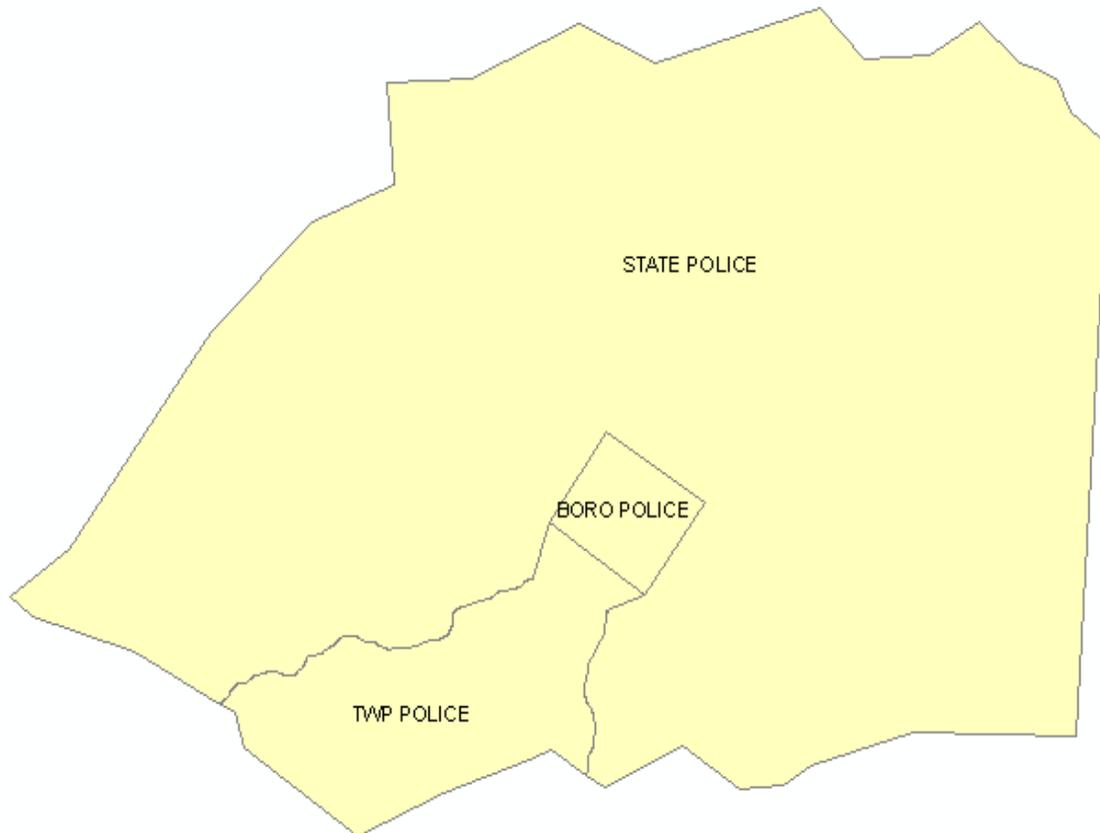


Figure 21 – Law Enforcement Response Boundaries

The remainder of this page intentionally left blank.

Figure 22 depicts a county broken into ESZs, with assigned emergency service numbers (ESNs).

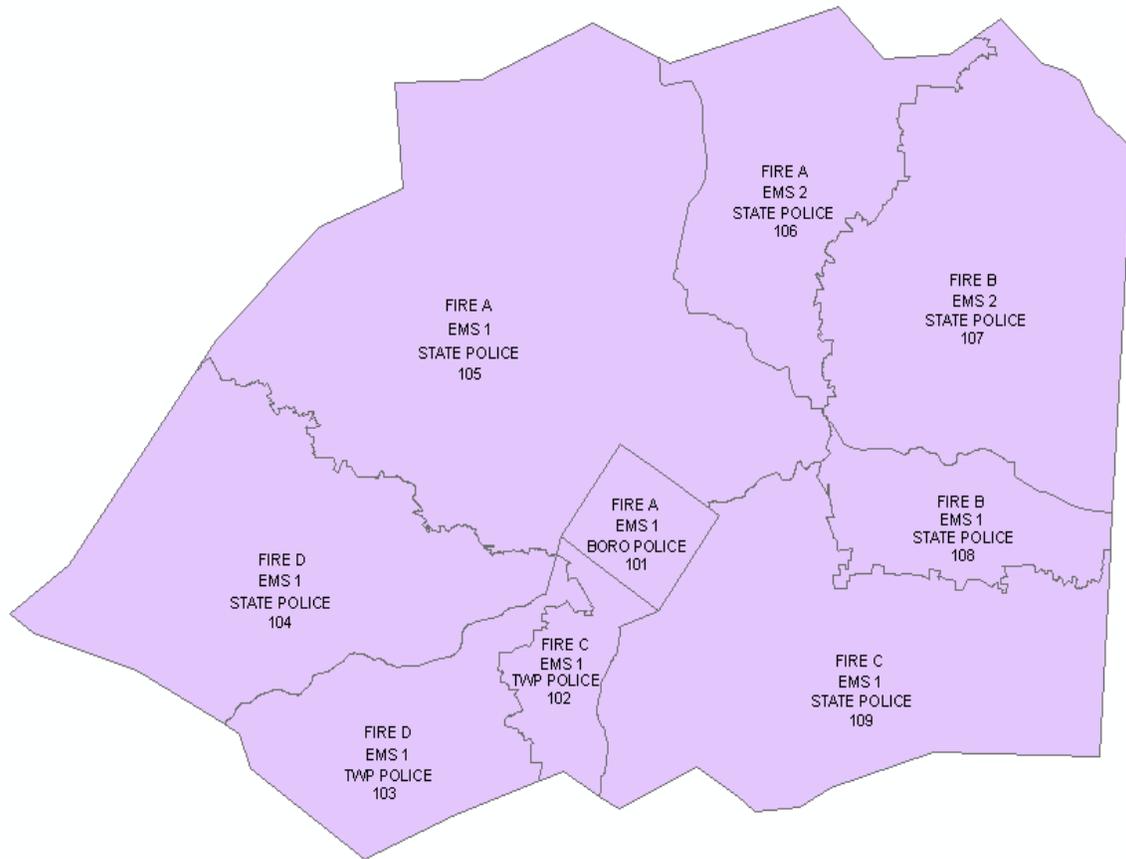


Figure 22 – County ESZs and Assigned ESNs

Each Emergency Service Zone (ESZ) is given a unique Emergency Service Number (ESN). This value is used in the Master Street Address Guide (MSAG) table to indicate the emergency responders for a given location.

Communications between adjoining response agencies is a very important factor in creating an accurate response map. Unfortunately, this is usually easier said than done, and the County may have to play the role of mediator in boundary discussions between providers. Hard copy (paper) maps showing street centerlines and municipal boundaries provide a great starting point for discussion in the initial creation of an ESZ boundary layer.

There should be no topology errors (gaps or overlaps) between ESZ boundaries. (This is covered in more detail in the centerlines section of the guide.) For boundaries that follow road centerlines, the centerline and polygon boundary should coincide, allowing for no gaps or overlaps.

Once the boundaries have been established, any changes to the boundary must continue to be communicated to 9-1-1 and/or the person(s) maintaining the GIS data. This is an important maintenance workflow process that should have a policy established between responders and 9-1-1 regarding how this protocol needs to function for the long-term maintenance of Emergency Service Zones.

Once the boundaries have been changed, associated attribute updates might need to be made to other local datasets such as road centerlines and address points. Examples include left and right ESN values in the road centerline attributes and the ESN field in the structure point attributes. Depending on the type ESZ boundary change that is made, splits in the road centerline segments may need to be merged or changed, as well as the ranged adjusted accordingly.

The remainder of this page intentionally left blank.

3. HOUSE NUMBERS

- House numbers must fall within the range of the centerline segment from which the driveway is accessed, and must be given the exact naming convention of the centerline segment. For "corner lot" structures where the front door is facing the street opposite of the driveway access, it is permissible to address from the front door providing there is accessibility for an emergency vehicle to park and use the front door.
- House numbers must be sequential, with odd numbers on one side of the street and even numbers on the opposite side of the street.
- House numbers should be whole numbers. House number suffixes such as ½ or R should be avoided.
- Addresses assigned to structure points/polygons in a structure dataset must match the address assigned by the telephone company in the ALI, both by house number and street name. Every effort should be made to maintain consistency between these two datasets.
- New addresses must be approved by USPS prior to resident notification of their new address. Typically, regional USPS address management offices are in charge of new address approval and will let the appropriate local post office know of the new delivery customer and assigned address. If the resident is not requesting mail delivery, it is still recommended that USPS be alerted of the new address.
- House numbers must validate within the MSAG database. This means that the house number must fall within the range assigned to the street centerline and follow the exact naming convention.
- As a general rule, multiple-unit structures having individual outside doors (townhouses, strip malls) should be given separate house numbers. Multiple-unit structures where there is one main door and individual units have separate doors inside (apartment buildings, traditional malls) should be assigned one house number for the entire building and the individual units assigned apartment numbers (residences) or suite numbers (businesses). The post office does not like apartment or suite values to be alpha-numeric, i.e. 1A, 201B. Numeric only is preferred. Please note that the new Michigan standards for structure attribution include separate fields for building name (BLDG), floor number (FLOOR), unit/apartment/suite number (UNIT), room number (ROOM), seat number (SEAT), and description of location (LOC). The long term vision for NG9-1-1 is to have local jurisdictions include this more detailed information in these fields, where applicable, to improve emergency response time to multiple-unit structures. Local jurisdictions may want to begin long-term planning for future attribution of these fields. NENA has just started a working group to develop recommendations for address point development.
- Trailer courts may be addressed in one of two ways. The roads within the trailer court can be named and assigned ranges, with each trailer receiving an individual house number. Or, the entire trailer court can be given one house number and each individual trailer assigned a lot number. The recommended practice is to assign individual street names and house numbers for each trailer within the trailer court.

The remainder of this page intentionally left blank.

4. STRUCTURE POINTS

Structure points, where they exist, can be used to validate against road centerlines to assure that all road names and address ranges on the road centerlines are consistent. This provides additional road name validation between the two datasets. If GIS structure points and road centerlines were developed in conjunction with one another, then road names, addresses and address ranges should, in most cases, match across both datasets. Running a process to geocode the structure points addresses against the road centerlines will flag any structure points that do not match the road name or address ranges within the road centerlines. Any structure point addresses that do not fall within an existing centerline range could signify that there might be a possible range issue on the road centerlines. If a structure point address does not match any road segment, it could be due to a road name inconsistency which can be reviewed on the road centerlines.

4.1 Structure Centroid Required Attribution

Structure centroids should have the attributes populated that appear in Table 10. These attributes are typically the required NENA addressing fields for today's wireline and wireless calls. It will be critical that, at minimum, these fields are complete and accurate for future call routing in NG9-1-1. The use of the attribution names established in the Michigan GIS 9-1-1 Database Standards Version 1.0 is recommended.

Table 2 – Required Addressing Fields for NENA 1.0 Model

<i>FIELD DESCRIPTION</i>	<i>EXAMPLE</i>
Address Number	100
Address Number Suffix	R
Prefix Street Direction	N, E, S, W, NE, NW, SE, SW
Street Name	MAIN, CENTER, ELMWOOD, THIRD
Street Type	ST, AVE, RD
Suffix Street Direction	N, E, S, W, NE, NW, SE, SW
MSAG Community Name	GREEN TWP
* ESN	103
Notes: * ESN – Emergency Service Number representing an Emergency Service Zone (ESZ)	

4.2 Synchronizing Structure and ALI Databases

It is important that the structure database and ALI database match each other, both by house number and street name. Every effort should be made to maintain consistency between these two datasets.

The ALI database is a tabular database that contains a telephone customer's information including telephone number, address, and primary account name. It is permissible to make corrections to either the structure database

or the ALI database, as long as both match. Corrections to the ALI database must to be sent directly to the telephone company for updating. It is not safe to assume that either the structure database or the ALI database will always be correct. Each error needs to be reviewed on an individual basis and the appropriate corrections made to the respective database.

Tables 13 and 14 depict a sample structure database and the corresponding sample ALI database. The boxes shown in pink in the structure table need to have the corrections shown in red to create a match with the ALI table.

Table 13 – Structure Database

HSE_NO	SUFFIX	PREFIX	ROADNAME	ROADTYPE	POST DIRECTION	COMMUNITY	ESN
1725		W	ALMOND	ST RD		MUNI A	123
100			BARTON	RD	N	MUNI B MUNI C	987
135			BETTY	ST		MUNI D	456 654

Table 14 – ALI Database

NPA	Calling Nbr	House Nbr	House Suffix Nbr	Prefix Dir	Street Name	Street Suffix	Post Dir	Community Name	State	Location	Customer Name	ESN
555	5550123	0000001725		W	ALMOND	RD		MUNI A	MI		DOE JANE	00123
555	5554321	0000000100			BARTON	RD	N	MUNI C	MI		SMITH JOHN	00987
555	5556789	0000000135			BETTY	ST		MUNI D	MI		JONES JAMES	00654

4.3 Common Structure Errors

4.3.1 Missing Values

All structure records should contain, at minimum, a house number, street name, community name, and ESN value. Records missing these values should be reviewed and populated with the correct values.

4.3.2 Street Name/Street Suffix Errors

The street name assigned to the structure point must match the street name assigned to the corresponding centerline. Having a misspelled street name or the wrong street suffix is a typical error that must be corrected.

4.3.3 House Number Errors

The house number assigned must fall within the range of its corresponding centerline. House numbers near the end of a centerline segment are sometimes assigned a house number that falls outside the range. It is important to be aware that this can happen. When an error of this nature is found, either the house number or the range should be corrected.

Other common house number errors are even-on-odd, odd-on-even, out-of-sequence, addressed from the wrong street, and not in sequential order.

4.3.4 Legacy Addresses

It is fine to maintain legacy addresses or addresses that were assigned many years ago and do not follow the current pattern established by the County, provided they fall in sequential order and maintain the odds on one side of the street and evens on the opposite side principle. Known legacy addresses that are not correct (i.e., a well known business that has an even number on the odd side of the street) may be kept and coded as an exception if so desired, although it is recommended that these addresses be corrected.

4.4 No GIS Structure Points

In jurisdictions where GIS address structure points have not been developed and are not available as a source layer to validate address ranges and road names on the road centerlines, other potential sources of address data could be used to validate existing road centerlines. For complete validation of addresses and address ranges, field verification is typically required in at least some capacity. Using the various sources of address information that follow can be a starting point to validate addressing information in the office and determine areas of concern that require field verification. If a jurisdiction does not have any of this source information available, it will be difficult to create an accurate structure layer and verify road centerline ranges with only limited field work. Typically, complete field verification would be required, which can become quite costly.

To manually add structure points using underlying orthophotography, place a structure centroid directly on the center of the structure that it represents. There are several ways to determine the correct attribution to assign to these points, as discussed in the following sections. If using a method where the points are created using a GIS program, the resulting centroids should be moved to the location of the structure that it represents.

4.4.1 Hard Copy Addressing Maps

Some jurisdiction will have paper plots or spreadsheets of addressing information that can be referenced to help verify road centerline road names and address ranges, and also aid in the development of an address structure points layer. Depending on the condition of any maps and the detail of information, the maps could be put through a large format scanner to create digital scans. The digital scans could then be geo-referenced to existing digital orthophotography or GIS road centerlines layers to become a digital reference for digitizing structure address points and assigning the addresses or simply verifying the road ranges against the addresses, if existing and visible, on the scanned geo-referenced image file.

4.4.2 GIS Digital Tax Parcel Layer

In Michigan, many equalization departments have tax parcel data in GIS format. GIS tax parcels can be used to determine the site address for many of the site structures within a jurisdiction. By performing basic geo-processing routines, the tax parcel polygons can be converted into parcel centroid points. The tax parcel addresses on these points can then be used to verify road name and address range values on the road centerlines. Verification will depend on the level of detail of the addressing information in the tax parcel data.

A geo-processing routine will need to be run to create a centroid for each parcel polygon. The point will be created by the GIS within the center of that polygon. The points will have the same attributes that are currently within the tax parcel polygons, including parcel identification number (PIN), which is the primary database key to link to any other information within a computer-assisted mass appraisal (CAMA) system data table, including current site address.

The CAMA table is joined with the site address field to the point attribute table by linking the tables on the PIN.

Although these geo-processing tasks require minimal effort, if the PINs between the GIS attribute table and the CAMA table are standardized and match one another, there are still anomalies within the parcel data that need to be considered before any addressing information can be used as a validation source for road centerline address ranges.

There may not be a unique field in the CAMA system for an actual site address versus mailing address. If there is a unique site field, it may not always be populated with just the actual site address. Typically, the site address is populated with the mailing address, which can be the same address as the site on the parcel or could be the mailing address of the owner who does not receive his mail at that location. There are instances where that address is simply a post office box or an out of town address.

There will be parcel polygons that have multiple site structures, each with unique addresses and the parcel may only have the main site address.

Figure 23 depicts an example of parcel centroid addresses with addresses that are mailing addresses located along this particular street.



Figure 23 – Parcel Centroid Addresses

4.4.3 ALI Database

The ALI database contains customer records for wireline installations for the telephone companies. Each record will have the 9-1-1 address of customer locations. The records can be geocoded to create a point layer representing each address within the ALI database. A road centerline layer will need to exist with address ranges in order to geocode the ALI records. A third-party data source could be used for preliminary geocoding. A third-party source may not have all of the correct road names or address ranges, but could provide a geocoding process to get many of the ALI records plotted for a source reference. There are some limitations to geocoding the points in this manner:

The ALI database only lists the records of wireline customers and therefore will not have site addresses for all structures. Addresses will not be in the database for those who have discontinued their wireline service and only use cell phones.

The ALI database is owned by the telephone company and a telephone company will sometimes provide one free extract per year to a PSAP upon request. However, this is not always the case and a fee can be charged for an extract of the data or multiple extracts per year.

If the ALI database is provided, the recipient will be required to sign a non-disclosure agreement as the combination of customer name, telephone number and address with the ALI database is confidential and not permitted for any unauthorized redistribution.

4.4.4 USPS Routing Sheets

USPS routing sheets are printed spreadsheets that show addresses in the order that the mail carrier delivers the mail. The spreadsheets typically contain resident information such as last name or a location description. These routing sheets can be obtained from the Address Management Systems (AMS) district. The routes on the routing sheets can be followed using any existing GIS data to verify road names and address ranges.

There are some considerations that need to be made with respect to the addressing information within the routing sheets. The routes do not show the addresses for locations that do not receive mail delivery. For instance, if a resident has a post office box instead of mail delivery, this address will not be listed in the routing sheets. The routing sheets will typically show apartment and suite numbers, providing that the resident or business at the location receives mail delivery.

A non-disclosure agreement will need to be signed as the information within the spreadsheets contains resident information.

4.4.5 Voter Registration Database

Voter registration databases, such as the Qualified Voter File (QVF) in Michigan, are typically updated in conjunction with driver's license registrations and can be used to help validate existing addresses within a jurisdiction. These addresses can be geocoded to centerlines to develop points that can be used to validate the address ranges on the centerlines. Any addresses that do not geocode can be reviewed to determine if there are road name inconsistencies or addresses that do not fall within an existing address range, possibly indicating road naming or

address range issues within the road centerlines. To inquire on the QVF, the respective County Clerk should be contacted.

4.4.6 Utility Databases

Utility companies can also be another resource for addressing information. Utility companies sometimes maintain their own GIS data for customer locations. They typically have, at minimum, database records with customer locations including address information. The customer records within a specific geographic area may not contain all of the addresses within that geographic area depending on the type of utility service being provided and the number of providers in the area. It might require contacting multiple utility companies.

Although a utility database might not include all of the addresses within a geographic area, the addresses that could be provided will be an additional source that, in conjunction with some of the other sources listed, can help validate the information across the road centerlines.

4.4.7 Local Municipalities

Local municipalities within a PSAP jurisdiction or within a county might have existing addressing source data that could be used to validate existing addressing information on road centerlines. If a local municipality still operates as an address authority and assigns addresses, there may be GIS data, spreadsheets or paper maps that show the inventory of addresses across a municipality.

To assure that all addressing across multiple jurisdictions is consistent and complete, effective collaboration is required to validate all addressing across the existing road networks.

4.4.8 Field Verification

Once an initial determination has been made as to all of the potential source data that could be available for review against the road centerline attributes, a process of bringing that information into GIS has to be undertaken to do an initial in-office comparison and any road centerline attribute updates in-office. By setting different labeling capabilities within GIS software, different source data can display addressing information for a person to review the data for road segments and compare to addresses from any combination of source data listed above. For example, the road centerlines can be labeled with road name and address ranges, a parcel layer could display any address information associated with each parcel, and a GIS layer from the utility company can be also labeled with addresses.

The remainder of this page intentionally left blank.

Figure 24 depicts an example of tax parcel source information with parcel addresses labeled and road centerlines address ranges labeled to assist in validating road names and address ranges.



Figure 24 – Tax Parcel Source Information for Road Centerline Validation

While reviewing data, road segments with road names or address ranges that cannot be verified with the additional source data should be flagged with a unique code in the attribute table to field verify the data. The same holds true for questionable existing information. Once all data has been reviewed in the office, all features that have been coded for further verification can be displayed with unique symbology. Plots can be developed by geographic area showing the feature that needs to be verified or data can be loaded onto a laptop that can be taken directly into the field for verification and any required updates.

The remainder of this page intentionally left blank.

Figure 25 depicts a laptop sample of structures requiring field verification.

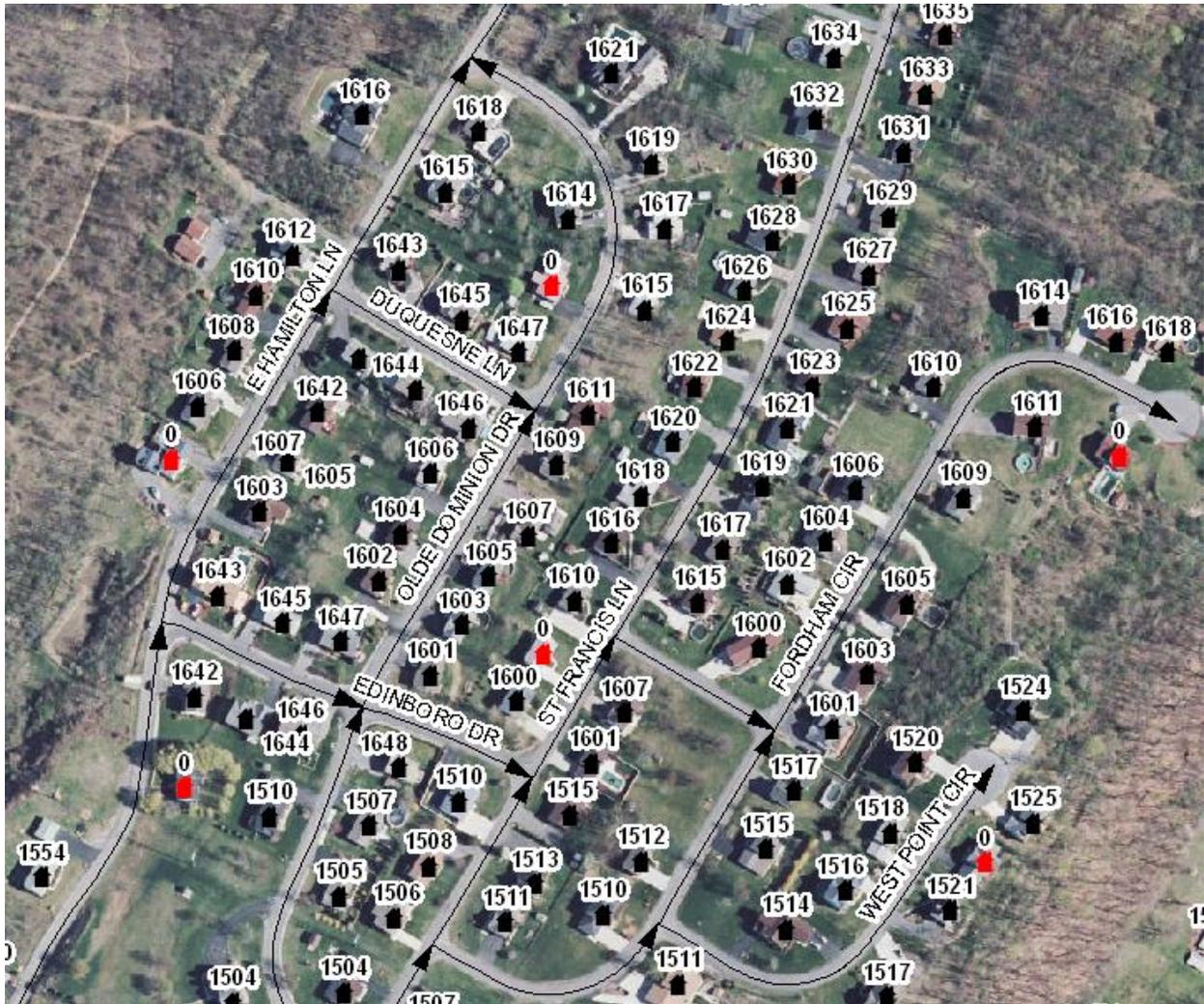


Figure 25 – Structures Requiring Field Verification

When reviewing addressing information for specific features in the field, field personnel should review the road names on the street signs and also the structure addresses along a respective street segment as it was flagged as a road segment with questionable accuracy. Where addresses are not visible and no one is available to verify address information, a door hanger should be left for the resident to respond with the appropriate information. Door hangers should include space for an identification number that corresponds to the same number in the digital data (or on the paper map), as well as the resident's name, address and telephone number. The front of the card should contain information for returning the response card. Including a telephone number for the resident to phone their address information works equally well.

Figure 26 depicts a sample door hanger.

Please provide the required information to L.R. Kimball by mailing the attached post card or contacting us at one of the following:

www.kimballdata.com/
 Phone:
 email:

⚡ A field representative working for the _____ County 9-1-1 Emergency System stopped by today to verify that we have your **CORRECT ADDRESS**. This information will be used by the Emergency Services (Fire, Ambulance, and Police) in your area.

⚡ The information will be used to assist in upgrading the enhanced portion of the County's 9-1-1 system.

⚡ Please take a moment to fill in the information below and drop this card in the mail. We thank you for your help.

⚡ Proper postage is required. **PLEASE PRINT!**

DETACH ALONG LINE BEFORE MAILING

TELEPHONE NUMBER LOCATED AT THIS STRUCTURE -

PHYSICAL ADDRESS OF THIS LOCATION

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP CODE _____

SEASONAL STRUCTURE STRUCTURE IS VACANT RENTAL UNIT

Owner/Occupant Mailing Address: (IF APPLICABLE)

ADDRESS _____ CITY _____ STATE _____ ZIP CODE _____

Place Postage Stamp Here

911

*The Next Life
It Saves
Could Be Yours!*

XXXX County, 9-1-1 Project

c/o L.R. Kimball

P.O. Box 1000
 615 West Highland Avenue
 Ebensburg, PA 15931

Figure 26 – Sample Door Hanger

The remainder of this page intentionally left blank.

5. DATA MAINTENANCE POLICIES

Addressing data maintenance is important. Accurate data can improve emergency response time. It is important to know what data a County has established and whether all datasets are consistently updated. Appendix 1 is a basic outline of what should happen when a county resident requests a new address. Is the department that assigns the new address updating the GIS database and notifying the communications center of this new address for input into the CAD system? Are USPS and the respective telephone company notified of the new address as well?

- Communications between all involved departments is a key factor in maintaining data. It is imperative that the entity assigning new addresses work with the departments that maintain the GIS data system and the CAD system to ensure data integrity between the two systems. For the correction of errors between datasets, it is important that the person updating the GIS data work closely with the CAD system administrator to correct errors as they are found.
- Depending on the CAD system, data updates can be made in one of three ways. The first is "on the fly" where an employee makes data updates directly within the CAD system. The second is a "map-roll" where the GIS data is imported into the CAD system at designated intervals, i.e., weekly, monthly, yearly. The third is a fairly new method where the CAD system is assigned a version on the same network as the GIS data and works directly with it. In these systems, CAD system data and GIS data are always the same. GIS data updates can be seen when they are made.

Data should be maintained by a County employee who understands basic 9-1-1 principles and is able to use mapping software proficiently. Ideally, two or three employees should be familiar with the processes and software. If there are no staff resources, this work may have to be outsourced. This data needs to be maintained on a regular basis and feature updates should be made daily or weekly, not monthly or yearly. It is much more costly to update data if it has not been maintained for a long period of time as opposed to regular weekly maintenance, adding in new constructions and making any necessary corrections to the existing data.

- It is important to take time when updating databases and make sure all data is updated accordingly. For example, if a street name changes, care must be taken to update not only all of the affected centerlines, but also any structures, MSAG table entries, and ALI records using the same street name. USPS and the telephone company must also be notified regarding the street name change. USPS maintains a database for mail sorting and delivery. For a customer to receive mail at a new location, USPS must be notified of the new address and add this address to their database. Telephone companies use their database to ensure that the appropriate emergency response is notified when needed.
- When field verifying a new structure point, take time to verify that surrounding house number and street signs are correct. Taking a laptop into the field is the best option due to the ease of using orthophotography to help with location. Printing paper maps and taking them into the field is also an option.

- When adding new structure points and road centerlines, it is a best practice to purchase a mapping-grade GPS unit. Newly added points and centerlines can be flagged; after new orthophotography is received, the added data can be double-checked for accuracy and any needed corrections made.
- It is recommended that a County contact surrounding counties for their data. This is especially important in areas that share responders or provide emergency dispatch services for a neighboring municipality. Where possible, it is a best practice to continue the street name and ranges from adjacent counties to limit confusion while traveling. The GIS repository will assist 9-1-1 jurisdictions in downloading neighboring data to incorporate into their 9-1-1 operations as applicable, and will also verify the spatial accuracy and attributes of features that share boundaries.

The remainder of this page intentionally left blank.

6. ADDRESS ORDINANCE

A County may want to adopt an addressing ordinance to establish a uniform addressing pattern throughout the county and provide guidelines for the enforcement of said policies.

At minimum, an addressing ordinance should contain the following items:

- Title
- Purpose
- Legal Basis
- Definitions Article
- Road Names Article
- Address Numbering Article
- Address Sign Display Article
- Saving Clause and Repealer
- Effective Date

The following items may be included, if desired:

- Coordination with other ordinances and statutes
- Permits
- Enforcement and Penalties
- Schedule of Fees
- Appeals Process

Other items may be added as required by the County.

In general, a County may choose to assign new addresses one of two ways: Distance-based Addressing or Grid-based Addressing. In distance-based addressing, house numbers are assigned based on a pre-defined interval, or number of house numbers available per one mile length of road. The majority of Michigan Counties with address ordinances posted on-line use this method with an address interval of 5.28 feet, or 1,000 numbers per mile with 500 numbers on each side of the road. In grid-based addressing, house numbers are assigned based on a pre-defined grid with an established northing and easting coordinate system. Drawbacks to this method include very large house numbers and out-of-sequence addresses on roads that do not run in an entirely north-south or east-west direction.

A sample ordinance is provided in Appendix 8.

The remainder of this page intentionally left blank.

7. SAMPLE FORMS

Having appropriate forms in place makes the data maintenance process easier to understand. These forms provide a means to track updates that should be made and perform quality control checks on a regular basis.

➤ **Address Request Form**

Appendix 2 is a sample form that a resident can use to request an address for a structure that has not previously been assigned an address. This could be for a new home or a new business that is being put into a renovated structure.

It is at the County's discretion whether there is a fee associated with providing this new address, and whether the County will provide/install a house number sign.

➤ **Road Name Request Form**

Appendix 3 is a sample form that a resident or developer can use to request a new street name. This name could be for a private driveway that is shared between several residents and should be named, or for a developer establishing a new subdivision.

It is at the County's discretion whether there is a fee associated with providing this name, and whether the County will provide/install a road name sign.

➤ **Data Discrepancy Form**

Appendix 4 is a sample form that can be used between different departments that maintain county datasets. It is important that all datasets in the county be updated at the same time when a new address is assigned or a discrepancy found. This form provides an easy way to track updates and make sure all databases are updated accordingly.

➤ **Telephone Provider Update Form**

Appendix 5 is a sample form that can be used to notify a telephone company of a new address or corrected address within the county. This form can be mailed or e-mailed to the County's contact person at the telephone company.

It is important for emergency call routing that the telephone company be notified of any new addresses or address changes.

➤ **USPS Address Update Form**

Appendix 6 is a sample form that can be used to notify the USPS Regional AMS office of a new address or corrected address within the county. This form can be mailed or e-mailed to the County's contact person at USPS.

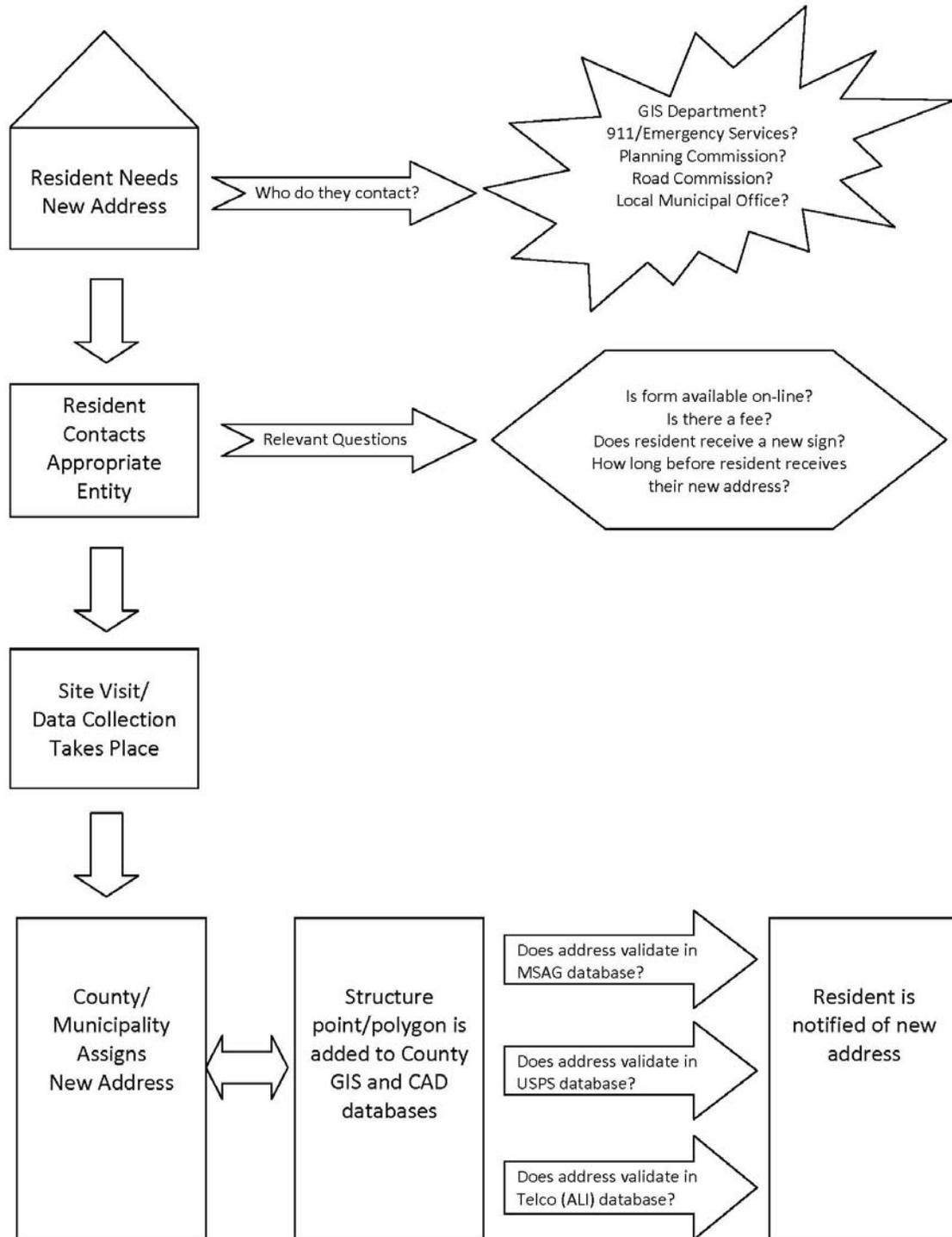
It is important for customer mail delivery that the post office be notified of any new addresses or address changes.

➤ **Sample Notification Letters**

Appendix 7 is two sample forms that can be used to notify residents of a new address or address change within the county. These are very basic letters and can be edited to reflect a County's interests.

The remainder of this page intentionally left blank.

APPENDIX 1 – ADDRESS GUIDE FLOWCHART



APPENDIX 2 – ADDRESS REQUEST FORM

A sample address request form may be found on the following page.

The remainder of this page intentionally left blank.

APPENDIX 3 – ROAD NAME REQUEST FORM

A sample road name request form may be found on the following page.

The remainder of this page intentionally left blank.

SAMPLE COUNTY

Address
City, State, Zip
Telephone
Fax
Email

NEW 911 ROAD NAME REQUEST FORM

FEE: \$ (includes sign and installation? Please fill out a separate form for each road name requested?)
Please make checks payable to Sample County.
Please allow # business days to receive confirmation.

FOR:

- Private driveway being converted to a named driveway.
Please attach a petition with the signatures of all current residents/property owners indicating that they agree to the road name change.

- New Subdivision.
Please attach plat.

Requested road name choices: You must list a minimum of three (3) road names that would be acceptable. Road names will be evaluated for duplication and the best name chosen out of those listed. If all of the road names listed are duplicates, you will be asked to provide additional road names. Please do not choose road names containing numbers, tree types, or proper names (i.e. Smith Ln, Jones Rd).

_____	_____
_____	_____
_____	_____

CONTACT INFORMATION:

NAME _____ TELEPHONE NUMBER _____

CURRENT MAILING ADDRESS _____

CITY _____ STATE _____ ZIP _____

DATE _____ SIGNATURE _____

LOCATION:

MUNICIPALITY _____

NAME OF MAIN ROAD ACCESSED FROM _____

DIRECTIONS TO NEW ROAD _____

OFFICE USE ONLY:

Date of Receipt of Application _____ Fee Receipt /Check # _____

Accepted Name Circled Above _____

Signed _____ Date _____

APPENDIX 4 – DATA DISCREPANCY FORM

A sample data discrepancy form may be found on the following page.

The remainder of this page intentionally left blank.

SAMPLE COUNTY

Address
City, State, Zip
Telephone
Fax
Email

DATA DISCREPANCY FORM

For use in the sharing of discrepancies found during review of data or during emergency calls. Please share with the appropriate data editors (i.e. GIS, CAD Supervisor, etc.). Please note that USPS and/or the telephone companies should also be notified of any discrepancies that may affect their databases.

STRUCTURE CONFLICT:

MUNICIPALITY _____

NAME OF CALLER _____ TELEPHONE NUMBER _____

ADDRESS OF STRUCTURE _____

CONFLICT _____

RECOMMENDED SOLUTION _____

WAS DATA UPDATED? _____ YES _____ NO If yes, DATE _____

CENTERLINE CONFLICT:

MUNICIPALITY _____

ROAD NAME _____

RANGES AFFECTED _____

CONFLICT _____

RECOMMENDED SOLUTION _____

WAS DATA UPDATED? _____ YES _____ NO If yes, DATE _____

CONFLICT FOUND BY:

NAME

DATE

APPENDIX 5 – TELEPHONE PROVIDER UPDATE FORM

A sample telephone provider update form may be found on the following page.

The remainder of this page intentionally left blank.

SAMPLE COUNTY

Address
City, State, Zip
Telephone
Fax
Email

911 ADDRESS UPDATE FORM FOR TELEPHONE PROVIDERS

A new address has been requested and assigned in Sample County.
A screen print showing the location/new address is attached.

- NEW STRUCTURE
 EXISTING ADDRESS CHANGE

Please list reason for change: _____

CONTACT INFORMATION:

NAME TELEPHONE NUMBER

CURRENT MAILING ADDRESS

CITY _____ STATE _____ ZIP _____

IF NEW STRUCTURE:

MUNICIPALITY OF NEW STRUCTURE _____

ZIP CODE AT LOCATION OF NEW STRUCTURE _____

NEW 911 ADDRESS ASSIGNED _____

IS RESIDENT REQUESTING PHONE SERVICE: _____ YES _____ NO

IF EXISTING ADDRESS:

MUNICIPALITY OF NEW STRUCTURE _____

OLD 911 ADDRESS FOR STRUCTURE _____

NEW 911 ADDRESS ASSIGNED _____

DOES RESIDENT CURRENTLY HAVE PHONE SERVICE AT THIS LOCATION: _____ YES _____ NO

IF YES, EXISTING TELEPHONE NUMBER AT THIS LOCATION _____

APPENDIX 6 – USPS ADDRESS UPDATE FORM

A sample USPS address update form may be found on the following page.

The remainder of this page intentionally left blank.

SAMPLE COUNTY

Address
City, State, Zip
Telephone
Fax
Email

911 ADDRESS UPDATE FORM FOR USPS REGIONAL AMS OFFICE

A new address has been requested and assigned in Sample County.
A screen print showing the location/new address is attached.

- NEW STRUCTURE
 EXISTING ADDRESS CHANGE

Please list reason for change: _____

CONTACT INFORMATION:

NAME TELEPHONE NUMBER

CURRENT MAILING ADDRESS

CITY _____ STATE _____ ZIP _____

IF NEW STRUCTURE:

ZIP CODE AT LOCATION OF NEW STRUCTURE _____

NEW 911 ADDRESS ASSIGNED _____

IS RESIDENT REQUESTING MAIL DELIVERY: _____ YES _____ NO

IF EXISTING ADDRESS:

OLD 911 ADDRESS FOR STRUCTURE _____

NEW 911 ADDRESS ASSIGNED _____

DOES RESIDENT CURRENTLY RECEIVE MAIL DELIVERY AT THIS LOCATION: _____ YES _____ NO

APPENDIX 7 – SAMPLE NOTIFICATION LETTERS

The sample mailers that follow should be sent on County or official letterhead.

The remainder of this page intentionally left blank.

COUNTY LETTERHEAD/SEAL

Sample County 9-1-1 Address Change Notification

SMITH JOHN & JANE
555 ANY RD
ANYTOWN, MI 12345

RE: 231 JEFFERSON ST

February 17, 2012

Through a cooperative effort of Sample County, your municipality, and the United States Postal Service, some addresses have been updated for the residents of Sample County to comply with the E-9-1-1 system.

<p>NEW ADDRESS: 230 JEFFERSON ST</p>

This will be the address you will use when calling 9-1-1 for emergency service. Please begin using this address for **9-1-1 purposes immediately**.

This will also be your mailing address unless you receive your mail at a Post Office Box (PO Box). **Please wait thirty (30) to sixty (60) days before making the address change.** If you wish to use your street address with your PO Box the PO Box must go directly above the Town, State, and Zip Code to meet Postal Regulations.

The Postal Service will deliver mail to your old address for a period of one year. Use the change of address portion of your bills as you pay them to change your address during that period.

To assist your local emergency providers and mail carriers, please place your new address on your house or business and on your mailbox at your earliest convenience. Please contact your local municipal office for details regarding sign placement, color, and size.

We regret any inconvenience this may cause you. This project is worthwhile and meant to save lives by enabling emergency personnel to locate citizens quickly in emergency situations.

We appreciate your cooperation and thank all those who helped with the addressing project.

If you have any questions please contact:

Contact Person at (999) 555- 1234 ext. 3011 M-F from 8 A.M till 4 P.M.

Control # 3868232823

COUNTY LETTERHEAD/SEAL

SMITH JOHN & JANE
555 ANY RD
ANYTOWN, MI 12345

Your New Address

328 CEDAR HOLLOW RD

Subject: Sample County Addressing Project

Your NEW ADDRESS has been activated but it is suggested that you wait thirty (30) to sixty (60) days before making the address change notifications/updates listed below.

Your city, state and zip code will remain the same as your old address UNLESS you receive notification from your Post Office that the city and zip code has changed.

This addressing change will support the Emergency System and improve response time.

Helpful Hints:

1. Notify all your correspondents of your NEW ADDRESS.
 - The US Postal Service will continue to deliver mail with your old address for one (1) year.
2. Your new address HOUSE NUMBER must be clearly visible on your rural mailbox.
 - You may want to place your HOUSE NUMBER on both sides and perhaps the front of your mailbox, as well as on your house or business. Also, be sure to post your house number at the end of your drive if a number placed on the house would not be visible from the road.
3. Common address notifications/updates:
 - Utility companies
 - Insurance companies
 - Sample County Voter Registration
 - Bank Accounts
 - Magazine Subscriptions
 - State Department of Transportation
 - Driver's License
 - Vehicle Registration
 - Fish & Boat Commission
 - Fishing License
 - Boating Registration
 - Game Commission
 - Hunting License
 - Christmas Card List
 - Personal Address List

Questions? Need Assistance? Contact the Addressing Dept. at Sample County

(999) 555-1234 - Monday thru Friday from 8am to 4pm

Control # «AID»

February 17, 2012

APPENDIX 8 – SAMPLE ORDINANCE

The following sample ordinance is intended to be used as a guide. Several Michigan Counties also have their addressing ordinances posted on-line if additional guidance is needed. References for the sample ordinance are provided as a footnote.⁹

SAMPLE COUNTY ADDRESS ORDINANCE

Section 1.01: Title

This ordinance shall be known as the **Sample County Address Ordinance of YEAR**, and hereinafter referred to as the Ordinance.

Section 1.02: Purpose

The purpose of this Ordinance is to establish a uniform county-wide system of assigning addresses to buildings to facilitate the locating of these buildings by law enforcement, fire, medical, and other emergency response agencies and services; utility companies; postal and delivery services; county services, such as building inspections, soil evaluations, property tax administration, property mapping, and other public affairs in **Sample County** by:

- A. Creating a formal addressing system for buildings and properties with standards and regulations for assigning addresses.
- B. Creating a coordinated system for the naming of public roads and private drives.
- C. Providing for notification of interested parties of assigned address numbers and road names.
- D. Providing minimum standards and regulations for the display of addresses.
- E. Providing for the enforcement of this ordinance.

⁹ Alpena County Address Ordinance: <http://www.alpenacounty.org/Ordinance/Addressing%20Ordinance.pdf>
Barry County Address Ordinance: <http://www.barrycounty.org/wp-content/uploads/2007/09/addressord.pdf>
Calhoun County Address Ordinance: http://www.calhouncountymi.gov/government/board_of_commissioners/address_ordinance/
Eaton County Address Ordinance: <http://www.eatoncounty.org/images/stories/PDF/CountyClerk/Ordinances/Address%20Ord.pdf>
Montcalm County Address Ordinance: http://www.montcalm.org/downloads/addressordinance030804_1.pdf

Section 1.03: Legal Basis

This Ordinance is enacted pursuant to Section 11 of Michigan Public Act 156 of 1851, as amended, being Michigan Compiled Law 46.11 (County Board of Commissioners).

ARTICLE II
DEFINITIONS

"ADDRESS" means the combination of a number and a road name.

"ADDRESS NUMBER" means a set of whole numbers as assigned.

"DISPLAY" means the manner the address number is affixed or displayed, so that is readily identifiable.

"INTERVAL" means a distance along a roadway covered by this ordinance of 5.28 feet, there being 1,000 intervals per mile (5,280 feet), 500 for one side of the road and 500 for the opposite side.

"PRINCIPAL BUILDING" means the primary or predominant building located on a parcel of land.

"POINT OF ORIGIN" means the beginning of a road.

"ROAD" means any vehicular way which a state, county, or municipal roadway, or is shown on an approved and recorded subdivision plat, or is a private drive that serves two (2) or more existing lots.

"ROAD NAME" means the proper name of the road, including a road prefix, if applicable, and a road suffix.

"ROAD PREFIX" means a compass or directional designation of a road being N (north), S (south), E (east), or W (west).

"ROAD SUFFIX" means the type or classification of a road (avenue, drive, lane, road, street, etc) or its abbreviation.

ARTICLE III
ROAD NAMES

Section 3.01: Similar Road Names

A road shall not be given a road name which is the same as or similar in spelling or pronunciation to an existing road name in **Sample County**.

Section 3.02: Naming of New Roads

A property owner, developer, surveyor, or plat proprietor shall make application for the approval of a proposed road name. Upon receipt of the application, the name(s) will be reviewed with all appropriate entities (GIS, emergency services, USPS, etc.).

The applicant will be notified within thirty (30) days of the acceptance or rejection of the proposed road name along with the reasons for the decision, if applicable.

Section 3.03: Changing Existing Road Names

It is the intent of this Ordinance to discourage the practice of changing existing road names except in situations where two identical or similar road names exist, or in other circumstances that clearly make the accurate dispatching of emergency vehicles impractical. A road name may also be changed when one road has two commonly used names or where portions of what appears to be the same road have two or more names.

A road name change may be ordered by the appropriate approval agency upon receipt of a written recommendation.

Section 3.04: Naming Private Drives

- A. Private drives, whether pre-existing or created after the adoption of this Ordinance shall be named when two (2) or more addresses exist or are established on the private drive. If the addresses are numbered off of the adjoining road they shall be changed to appropriate addresses using the private drive name.
- B. The owners/residents shall be consulted before a road name for the private drive is selected and approved.
- C. It is the responsibility of the owners/occupants with addresses on the private drive to erect and maintain a suitable sign at the intersection of the private drive and the adjoining public road clearly showing the name of the private drive. The sign should follow all established specifications for road name signs, both at the county and local municipal level.

ARTICLE IV ADDRESS NUMBERING

Section 4.01: Rural Address Numbering System

The rural address numbering system which is structured as follows shall generally be used except when other existing municipal systems are more appropriate, as deemed by the appropriate approval agency.

- A. Numbers shall start with 0 at a logical point of origin with address numbers being evenly spaced, 1,000 per mile, or having an address interval of 5.28.
- B. Address numbers shall be whole numbers.
- C. Odd numbers shall be on the left side of the road and even numbers on the right side of the road when standing at the point of origin and looking in the direction of increasing addresses.
- D. Address numbers shall be assigned so they run consecutively starting at the point of origin so that numbers are not out of sequence.
- E. Address numbers in common use prior to the adoption of this ordinance may continue to be used if the system is definable and can be administered and maintained for future construction of buildings.

Section 4.02: Changing Address Numbers

It shall be the policy of this Ordinance to discourage the practice of changing existing addresses or address numbers which are already in use except:

- A. If the existing number is not in sequence.
- B. If the existing number does not follow the odd/even principle.
- C. If the existing number is such that the assignment of address numbers for new buildings is not practical and in keeping with the requirements of this ordinance.
- D. When a new road is constructed or recognized which results in the most appropriate address for a building to be from the new road rather than the original road.
- E. When an address is duplicated or otherwise violates this ordinance.

Section 4.03: Notice of New Address

- A. When a person applies for a new address, the new address shall be assigned the person provided with a form containing:
 1. The building's address number.
 2. The road prefix, if applicable.
 3. The road name.
 4. The road suffix.
- B. When a resident's address is changed pursuant to this Ordinance, the resident shall be notified with a form containing:
 1. The old address.
 2. The new address.
 3. The reason for the change.
 4. The effective date of the change.
- C. Prior to the effective date of any address change, all of the appropriate approval agencies must be notified in writing.

ARTICLE V DISPLAY OF ADDRESSES

Section 5.01: Display

All principal buildings shall be required to display an address number in the manner prescribed in this Ordinance.

The resident, occupant, or owner of a principal building shall display the address number in such a manner as to be plainly visible and legible from a vehicle traveling on the road that is named in the address. All numbers shall be

Arabic numerals (0, 1, 2, 3, etc.) of at least three (3) inches in height or larger and of a color that contrasts with the background color of the structure supporting the numbers.

When the principal building is located more than one-hundred (100) feet back from the traveled centerline of the road that is named in the address, or if the view of the principal building is obstructed by trees, shrubs, or another building, the address number shall be displayed on a sign attached to a post located within twenty (20) feet of the centerline of the driveway and between ten (10) and twenty (20) feet back from the edge of the traveled roadway provided that any sign used to comply with this ordinance must also comply with applicable zoning regulations concerning the location and size of signs. The address number shall be displayed at a height of at least four (4) feet above ground and not higher than six (6) feet above ground.

ARTICLE VI SAVING CLAUSE AND REPEALER

The provisions of the Ordinance are hereby declared to be severable, and if any clause, sentence, word, section, or provision is declared void or unenforceable for any reason by a court of competent jurisdiction, the remaining portions of the Ordinance shall remain in force. All Ordinances or parts of Ordinances of **Sample County** in conflict with any of the provisions of this Ordinance are hereby repealed.

ARTICLE VII EFFECTIVE DATE

This Ordinance shall take effect on **DATE** or when notice of its adoption is published at least once in a newspaper of general circulation in **Sample County**.