

Excerpt from the March 30, 2005 Coordinating Committee Meeting Summary:

5b(1) Street Centerline Dataset: E911 Suitability Enhancements

Chinander provided an overview of the workgroup's efforts. Dolbow explained the workgroup's purpose, vision, objectives, definitions (expansion of TLG paradigm, not changing it), concepts of Core Geographic Unit and single official source, and the proposed vision in general.

In response to a question from Knippel about how the proposal ties into current efforts by Mn/DOT related to its Linear Reference Model (LRM) project, the group concurred that the potential exists to tie the two projects together, but the lack of address ranges in the Mn/DOT street centerline database is an impediment that needs to be resolved. All concurred that a good deal of duplication currently exists in the management of street centerline data and that a goal should be to ensure consistency with Mn/DOT's efforts to the maximum extent possible.

The group also concurred with Knippel's realization that the vision proposed by the Street Centerline Workgroup goes beyond typical GIS implementations and will involve agreement on intergovernmental policies to succeed. Staff affirmed that the workgroup concluded early on this would need to be the case to make any serious and long-term efficiency improvements. Chinander concurred, noting that the need to establish compliance with the Master Street Address Guide (MSAG) is an example of the need for effective lines of communication with the 911 community that have not been widespread in the past.

Laumeyer encouraged the group to consider involving utility interests as they also have emergency management needs and they, like the 911 community, need street and address data before the counties formally include plat information in their parcel systems. Laumeyer was offered an opportunity to participate in the workgroup and participate with the next phase of the effort.

In response to a question from Maki, Dolbow commented that the current regional street centerline dataset was endorsed for geocoding functions, not routing, noting that the topology is lacking for routing. He also commented that features important to the E911 community, such as ring roads at malls, trails, etc. are missing from the current regional street centerline dataset, and finally that the spatial accuracy in some cases is in need of improvement.

Claypool cautioned that inaccuracies in the location of city boundaries need to be taken into account and that the "go-to" authority to fix such inaccuracies is not necessarily easy to determine. Dolbow and Chinander noted they expect a number of these types of issues to arise as the details of the technical and organizational strategies begin to come together.

Knippel commented that this proposal will likely result in an expansion of the core street centerline data acknowledged as important to everyone versus that currently available via the current regional street centerline dataset. Wencil commented that Mn/DOT should be kept in the loop related to the concept of unique identifiers. He noted that he would like to eventually see address data attached to MnDOT's data, that it be managed as a component of the LRM, and that the USGS have access. Givens commented that the current communication link between Dan Ross and Dolbow is likely the best way to achieve the desired coordination.

In response to a question from Maki, staff affirmed that the proposed vision for a federated (multi-participant) solution includes an emphasis on organizational roles and responsibilities necessary to create the desired data, as well as, secure commitments from organizations with the resources and needs to maintain its currency, in addition to defining the desired data components themselves.

Bitner encouraged the workgroup to investigate incorporation of Web Mapping and Web Feature Services into the proposed vision in addition to physical sharing of the actual data.

Motion:

Chinander moved and Wencil seconded to accept the vision proposed by the E911 and Street Centerline Workgroup, as outlined in the agenda materials and to direct the Workgroup to develop a proposal for the technical and organization components necessary to achieve the proposed vision. Motion carried, ayes all.



TO: Coordinating Committee
FROM: E911 Address & Street Centerline Workgroup
Staff Contacts: Michael Dolbow (651-602-1812) and Gordon Chinander (651-603-0054)
SUBJECT: Vision – E911 Compliant Regional Street Centerline Dataset
DATE: March 14, 2005
(For Mar 30th Meeting)

INTRODUCTION

The E911 Address & Street Centerline Workgroup respectfully requests comment and direction from the Coordinating Committee on its proposed vision for a next generation Regional Street Centerline Dataset. This group formed in fall 2004, primarily to investigate how to address unmet needs of the 911 dispatching community with respect to the currently endorsed regional street centerline dataset. Another component of the effort recognized a general preference to incorporate locally produced street data into the U.S. Census Bureau's TIGER datafile.

VISION STATEMENT

MetroGIS seeks a public sector, regionally seamless addressable and routable street centerline dataset that meets the needs of the E911 dispatching community in addition to the functionality provided by the currently endorsed dataset.

The workgroup has concluded that it should seek acceptance of this vision from the MetroGIS Coordinating Committee and the Metropolitan 911 Board before developing the detailed technical and organizational components necessary to achieve it. The 911 Board is acknowledged as the organization with the greatest need for the proposed regional solution. As such, the proposed vision is currently being vetted with its management to ensure they are also satisfied with the general proposal.

Assuming both the 911 Board and the Committee conclude that the proposed vision warrants further consideration, a formal recommendation is anticipated, accompanied by a white paper to explain the specifics. These items will be presented to the Committee for its consideration at the June meeting and to the 911 Board prior to that time.

Refer to the Reference Section for more information about the Workgroup and its efforts to date.

JUSTIFICATION

Most of the 27 Public Safety Answering Points (PSAPs) that serve the seven county area use GIS mapping applications to accurately locate calls and dispatch emergency services, especially for wireless calls. Many PSAPs currently use or modify the regional centerline dataset endorsed by MetroGIS, which is created and maintained by The Lawrence Group (TLG). However, this dataset was not created for 911 uses and does not satisfy some of the 911 community's business needs. One of the largest "needs gaps" is the data model's lack of compliance with the Master Street Address Guide (MSAG). Dispatchers also need the ability to route vehicles into areas that are not currently represented, such as private developments, utility access roads, and parking lots.

Presently, three counties and a core city have created or are considering creating and maintaining their own centerlines for a variety of reasons. Four of the counties, to our knowledge, do not have any immediate plans to move away from using the regional solution provided by TLG. The Metropolitan 911 Board recognizes the importance of MetroGIS's efforts to establish data standards that facilitate the integration of data from multiple producers.

The E911 Address & Street Centerline Workgroup has concluded that a regional solution should be pursued to resolve deficiencies in the endorsed regional street centerline dataset with respect to the needs of the E911 community. If possible, this regional solution should also further the integration of locally

produced street centerline data into TIGER datafiles maintained by the US Census Bureau. Without the desired organizational interoperability, the following issues persist:

1. Costly duplication of effort pertaining to data capture, management, and customization for E911 dispatch solutions.
2. Difficulties in achieving cross-jurisdictional interoperability of accurate and trusted address **data**, which is critical when coordinating the dispatch of emergency services in a regional context.
3. Higher costs for other government stakeholders using the address data when regional consistency is not maintained – the reason for establishing the current regional solution in the first place.
4. Inconsistencies between the US Census TIGER data and locally produced street data lead to major inefficiencies, and hinder communications with the Census Bureau in regards to geography updates. The proprietary nature of the TLG street centerline dataset currently precludes integration into the TIGER dataset.

OVERVIEW OF THE VISION

The next-generation regional centerline solution is envisioned as a compilation of geographically separated datasets created and maintained by multiple counties and/or municipalities. This would require establishing standards for both the spatial and attribute components to ensure compatibility across the seven-county region. The dataset would build upon the currently endorsed regional street centerline dataset created and maintained by The Lawrence Group. It would meet the needs of the E911 community and, if possible, be available for integration with the TIGER datafile maintained by the U.S. Census Bureau.

Before pursuing such a regional solution, a definition of “street centerlines” must be agreed upon. Previous discussions have led to a general consensus, but no definition has been committed in writing. The E911 Workgroup suggests the following definition as it applies to this initiative:

*A **street centerline** represents a discrete, linear, graded land surface navigable by at least one type of vehicle, with at least one established connection to a network of similar elements.*

This definition is highly tailored for E911 purposes, allowing geographic centerlines to represent almost any location that can be reached by emergency vehicles, including:

- Public and private roads
- Access roads and trails to utilities, train tracks, and private facilities
- Perimeter roads *and* internal parking accessways for mall and shopping centers
- Graded and paved bicycle and/or walking trails navigable by small emergency vehicles
- Newly constructed dirt/gravel roads in new developments
- Navigable emergency easement surfaces for otherwise landlocked developments
- Restricted access turnaround connections on divided highways

The definition *excludes* other features, such as:

- “Platted” centerlines defined by right-of-way parcel boundaries that are NOT navigable due to existing buildings or other permanent obstructions
- Other surface transportation features that are restricted to certain types of vehicles, such as train tracks or water bodies
- Wilderness (non-graded) trails that are inaccessible to the typical emergency vehicle

While this definition expands upon the current TLG data model to include new “feature classes” and more existing classes (such as private roads), it does not shift the paradigm of the data model itself. The main components of the data set are still roads and highways, and the added features “fit” within the established network.

As part of defining and establishing regional data standards, this project also proposes additional centerline attributes, changes to the centerline geography standards, and changes to the current maintenance requirements. The attribute standards are the minimum deemed necessary to standardize the regional data solution for 911 purposes. Other attributes can be added by the data producers for internal or external use, producing a single product that still meets many business needs. Some attributes may not

be required for certain data producers, who **would not** be asked to populate an attribute in the proposed standard unless they perceive an internal business need to do so.

In summary, the desired end product would be a compilation of multiple centerline datasets provided by local data producers, collected and re-assembled to form a seamless region-wide layer. It would utilize the data standards endorsed by the Metro911/MetroGIS communities to ensure MSAG compliance and compatibility between data producers.

MAJOR OBJECTIVES

This broad vision incorporates the following major objectives, which outline a process to define the technical and organizational components necessary for an interoperable, multiple-use “centerline” product. (*Not intended to be listed in any order of priority. The numbering is provided only to facilitate comment*):

1. Continue to pursue the concept of a “single official” source of street centerline data for any given jurisdiction, or “Core Geographic Division”. This was a core objective of MetroGIS’s 1998 endorsement of the TLG Street Centerline Dataset as the preferred geocoding solution for the metropolitan area. Defining a “single source” of street centerline data for a given Core Geographic Division reduces the potential for inaccurate/inconsistent addresses and streamlines the process of mitigating anomalies, as they arise. Within a Core Geographic Division, this authority needs to maintain a relationship with both E911 Responders and the other personnel involved in (and affected by) the efforts outlined in this vision.
2. Each Core Geographic Division (based on county, PSAP, and/or city jurisdictions) would readily nest with adjoining core geographies to achieve interoperable street centerline data across the entire seven-county metropolitan area. In many cases, Core Geographic Divisions could include multiple municipalities.
3. The Metropolitan 911 Board would serve as the Regional Custodian for E911 purposes, monitoring user satisfaction and supporting desired modifications to practices and policies. Depending on the result, the community may wish to ask the Metropolitan Council to continue as Regional Custodian for non-E911 centerline data business needs.
4. Organizations and their personnel responsible for local government procedures pertaining to approval of new streets (public and private) would be encouraged to serve in the capacity of a Primary Producer. As new streets are approved, a Primary Producer would either directly add and modify street data (geography and attributes) for the Core Geographic Division’s datafiles or work closely with a Third Party to maintain the currency of the data. The vision currently assumes the Metropolitan 911 Board, as Regional Custodian, would be responsible for compensating any Third Parties and coordinating such efforts.
5. The datafile for each Core Geographic Division would be accessible by an individual(s) with read/write privileges from each jurisdiction that has authority and GIS capabilities to modify street data within that jurisdiction. Each authorized individual would have the ability (and responsibility) to modify, add, or delete data within their jurisdiction as necessary.
6. The proposed vision assumes multiple avenues for creating, maintaining and storing centerline data, and providing periodic updates to the Regional Custodian. For example, some individual cities might maintain local databases for just their jurisdiction, and other larger government units (PSAPs or Counties) might maintain data for multiple cities and townships. However, this will require significant negotiation, as overlapping jurisdictions with differing topologic requirements will have a conflict with this procedure.
7. The Regional Custodian would be responsible for overseeing aggregation of the Core Geographic Divisions into a seven county datafile for stakeholders who need simultaneous access to multiple Core Geographic Divisions. *This may be a virtual aggregation as it is currently for access to the regional parcel dataset.*
8. The proposed solution needs to have an outreach component to inform all affected and relevant interests about its benefits, and to grow participation in reporting anomalies as they are identified.
9. Procedures for maintenance of street centerline data would be fully coordinated with procedures to maintain the proposed Regional Occupiable Unit Regional Dataset. (See Agenda Item 5b (1)).

10. Some mechanism (likely a new attribute field) would be incorporated into the data model to handle new public and/or private streets that are being built under existing construction contracts, but are not yet “platted” by the local government. These centerline elements would be added to the Core Geographic Divisions as “Streets under Construction”, in anticipation of their imminent navigability.
11. The vision requires reconciling the regional GIS centerline database with the MSAG database to ensure data compatibility and correct any errors that may be found. The centerline dataset uses a completely different addressing standard (USPS) than the MSAG, which hinders current dispatch efforts. Once this reconciliation is complete, a software solution, such as “Graphic MSAG”, could be used to simultaneously maintain both databases (MSAG & GIS). However, it is important to prevent MSAG formatting requirements from conflicting with locally established procedures. See the Background Section for more information about MSAG conventions.
12. The final proposal needs to recommend accuracy guidelines and procedures as regional best practices. A variety of positional accuracies may be acceptable if they are clearly documented.
13. Achieving the vision requires compliance with the Attribute, Topology and Maintenance specifications proposed in Attachment A: “General Specifications for an Addressed Centerline Map Layer for Local Public Safety Agencies”. These specifications build upon the current procedures of many E911 data producers.
14. Any privacy and access issues must be appropriately addressed.

RECOMMENDATION

That Coordinating Committee:

- 1) Comment on the components of the proposed vision for a next-generation regional street centerline dataset.
- 2) Suggest desired modifications for the Workgroup’s consideration
- 3) Direct the Workgroup to develop a proposal for the technical and organization components necessary to achieve the proposed vision.

REFERENCE SECTION

BACKGROUND ON WORKGROUP

1. The workgroup initial met on December 2, 2004 at the request of the Staff Coordinator. The Staff Coordinator had learned of two counties and Minneapolis' efforts to develop their own street centerline datasets because the endorsed regional solution was not meeting their E911 needs. The participants concurred that a regional solution to the need of an E911 compliant regional street centerline dataset should be pursued. As such, the project was included in the 2005 workplan and a formal workgroup was established by the Coordinating Committee at its December 2004 meeting.
2. Survey of E911 Technology Requirements and Specifications: in January 2005, the Workgroup decided to survey the 10 vendors who provide E911 CAD/GIS software and services to the PSAPs in the Metropolitan Area. The survey was developed by listing the general requirements of an E911 system that is well known by the staff at LOGIS, and asking vendors to identify those specifications as required, not required, or prohibitive to their solution. Seven of the ten vendors replied, and while many of them had similar requirements, none of the specifications were listed as prohibitive to their solution. Thus, the results of the survey have been integrated into the General Specifications document.
3. The workgroup's membership, meeting agendas and summaries, findings of investigations, etc. can be viewed at http://www.metrogis.org/data/info_needs/street_addresses/add_wkgrp.shtml.
4. Michael Dolbow of the MetroGIS support team and Gordon Chinander, GIS Coordinator for the Metropolitan 911 Board are co-facilitating the workgroup. Participants in the workgroup include:
 - Ben Verbick, LOGIS
 - Erin Naughton, City of Minneapolis
 - Scott Simmer, Hennepin County
 - Kent Tupper, Dakota County
 - Dan Pfeffer, Scott County

MASTER STREET ADDRESS GUIDE (MSAG)

"MSAG compliant" is defined as meeting the Master Street Address Guide to road naming conventions and Proper address ranges. This standard is endorsed by NENA (National Emergency Number Association). This organization creates national E911 GIS data standards.

A better definition and description of the MSAG and its connection to E911 processes and GIS/CAD solutions will be included in the white paper to be produced as part of this project.

Attachment A

General Specifications for an Addressed Centerline Map Layer for Local Public Safety Agencies

Introduction

Various GIS professionals with experience in E911 CAD/GIS solutions coordinated in the winter of 2004-05 to draw up a standard, regional street centerline data set geared toward use within E911 CAD/GIS software packages. Starting with the requirements of a well-known CAD/GIS package, the group surveyed various vendors of similar services in the seven-county area and used the consolidated requirements and desired standard attributes to create this document. The result is intended to be a general specification for an addressable centerline data set that:

- a) Preserves interoperability and currency across the seven county area
- b) Maintains functionality currently provided by the TLG Street Centerline Dataset, such as address-matching and routing, while addressing its limitations
- c) Meets the needs of the E-911 community

The basic concept of an addressed centerline map layer

The intended use of an addressed centerline map layer for public safety dispatch and E911 is generally two-fold. First, the map layer is used by the dispatch software to verify addresses as they are relayed to the dispatcher. In this scheme, the map layer may be an integral part of a “geofile” which may include all street names, address ranges, intersections, and optionally, common place names within the jurisdiction of the dispatch center. The geofile will also assign the appropriate agency, district, ESN zone, and unit to respond to the incident.

Second, the map layer may be used during and after a dispatched or recorded event to “geocode” or locate the incident on a map. Again, this requires that the map layer be inclusive of all street names and address ranges.

In its simplest form, the addressed centerline map layer need only represent a very basic street centerline network, with straight line segments connecting intersections (Figure 1). Provided the relative accuracy of the segment attributes is correct, most (if not all) functions of dispatch and crime analysis can be met.

Figure 2 illustrates the same set of centerline segments built with absolute accuracy, aligning the map and the geocoded events with other map layers used for dispatch or crime analysis. The workgroup chose to develop a geofile based on absolute accuracy.

Figure 1



Figure 2



Attribute requirements for the centerline map layer

The table below lists the primary attribute fields of the addressed centerline layer. Actual field names are not significant. Note that the attribute requirements for the consortium agencies do not include fields for boundary designations such as city, zip code, agency, ENS zone, etc. These designations are assigned through polygon map layers of the geofile. Their relationship to the centerline map layer is described in the next section.

Unique ID	A unique integer identifying each segment. This ID cannot be duplicated anywhere within the multi-jurisdictional geofile of the system. In order to comply with this requirement each agency is assigned a specific ID range large enough to accommodate any expansion.
Name	A 32-character field containing the prefix direction, base street name, street type, and suffix direction. Alphanumeric only. No special characters or punctuation allowed – for example, instead of “Main St.”, use “Main St”, without the period. Although there is no restriction on naming conventions, the consortium chose to follow the MSAG standard. Local differences along agency boundaries were determined by agreement among the participating agencies.
Left Low Address Left High Address Right Low Address Right High Address	Numeric only. High address values must be equal to or greater than low address values. Values must not overlap. Values must be all even on one side and all odd on the other. Either side or both may be zeros. Cul-de-sacs must follow one of two addressing schemes; <ol style="list-style-type: none"> 1.) Odd on one side, even on the other. 2.) Zero on one side, all odd or all even on the other.

While these primary fields are the minimum requirements for geocoding incidents, there are several more attribute fields that would enhance the routing capabilities of the data, and establish a highly effective standard. While many agencies may not be able to populate these fields at present, requiring their presence in the database schema allows provides a placeholder for this ability in the future. The table below details both the minimum required fields (in **bold**) and the additional fields.

FIELD	DESCRIPTION	SOURCE	NOTES
Rd_ID	Unique ID Number		Usually internal to system
S_length	Line segment Length		Segment lengths (meters, feet)?
Full_Name	Concatentation of Prefix, Street Name, Type & Suffix		MSAG comes as a combined Field
LeftFrom	Left from Address (Low?)		Lo Address Range (Left)
RightFrom	Right from Address (Low?)		Lo Address Range (Right)
LeftTo	Left To Address (High?)		High Address Range (Left)
RightTo	Right to address (High?)		High Address Range (Right)
Rd_Pre	Street Prefix Direction (N,S,E,W)		Street Directional
Rd_Name	Street Name		Street Name
Rd_Suf	Street Suffix (N,S,E,W)		NENA Calls for this Directional
Rd_Type	Street Type (Dr, St, Av)	USPS Pub28 Appendix	aka Road Type, NENA Calls for this suffix
City_L	City/Township Left		Same as NENA MSAG Community
City_R	City/Township Right		Same as NENA MSAG Community
County_L	County/FIPS Code Left		NENA uses FIPS code
County_R	County/FIPS Code Right		NENA uses FIPS code
State_L	State Left		State
State_R	State Right		State
Zip_L	Left 5 Digit Zip Code		Zip Code
Zip_R	Right 5 Digit Zip Code		Zip Code
MSAG_CoL	MSAG Community Left		Community as MSAG defines
MSAG_CoR	MSAG Community Right		Community as MSAG defines
ESZ_L	Left Emergency Service Zone/ESN		ESZ (Left)

FIELD	DESCRIPTION	SOURCE	NOTES
ESZ_R	Right Emergency Service Zone/ESN		ESZ ((Right)
PSAP_ID	PSAP Identification	Get from ESZ/ESN	Responding PSAP Name
Postal_L	Postal Community Left		Community as Postal Service defines
Postal_R	Postal Community Right		Community as Postal Service defines
FIPs_L	FIPS code left of line segment		Federal Information Processing Standards pub
FIPs_R	FIPs code right of line segment		
F_Xstreet	From Cross Street		From Cross Street
T_Xstreet	To Cross Street		
One_Way	One way		TF (To From), FT (From To), NT (No Travel), or Blank (Two way)
Tcap_F_T	Turn capability From-To		code determines turn capability
Tcap_T_F	Turn capability To-From		code determines turn capability
OvrPs_Ht	Overpass Heights	MN/DOT ?	Overpass Clearance Heights
Road_Class	DOT Code	MN/DOT	DOT Classification Code - source
Spd_Limit	Speed Limit		Speed Limit
Source	Source of Existing Data		Where did data originate
User_ID	ID of User Editing Line		
Date_Mod	Date Last Updated (mmddyyyy)		Date Last Updated

Topology requirements

The following topology requirements are specific to the construction and maintenance of the public safety system geofile. They do not affect the ability of the addressed centerline map layer to act as a medium for geocoding events within the CAD system's tactical map or the records system's crime analysis mapping software.

However, a topologically correct geofile allows the systems to verify addresses and assign those addresses to specific agencies, cities, ENS zones, districts, beats, units, etc. It is also vital for defining intersections, common place names, and premise and hazard data. The software's geofile is created by combining the addressed centerline map layer with polygon map layers of all areas required by the agencies. The consortium agencies maintain areas for city, police district, EMS district, fire district, and reporting district. To maintain proper incident assignments, the addressed centerline map layer and area/boundary map layers must adhere to the following topology requirements:

1. Each centerline segment must share an exact begin or end node with another centerline segment.
2. For routing purposes, segments should not overlap.
3. The centerline segments must be drawn in the direction of increasing addresses.
4. If segments intersect without begin or end nodes, (i.e. overpasses or underpasses) a street intersection is not established and therefore can not be geocoded.
5. Centerline segments must be broken at all intersections with boundary lines.
 - A boundary line must contain a node at the exact location at which it intersects a centerline node.
6. Boundary lines that are coincident with centerline segments must be exactly coincident with the centerline, including all vertices.

The initial topology of the centerline layer and the boundary layers is maintained within shapefiles or a geodatabase using ESRI's ArcMap (ArcEditor). An integrated utility is used to promote these layers to the functional geofile of the system.

Due to the topologic relationships required between the centerline layer and the boundary layers, the workgroup chose to “lock” the locations of segments in the centerline layer. We try to avoid making cosmetic changes to centerlines, as adjustments to those that cross or coincide with boundaries would require subsequent adjustments to the boundary layers.



Figure 3



Figure 4

For example, Figure 3 shows a centerline, Main St, which coincides with the boundary between Zone 1 and Zone 2. If Main St is moved even slightly, as in Figure 4, event addresses along the southern side of the street would be incorrectly assigned to the authorities responsible for Zone 1.

Streets divided by a median are generally drawn as a single street segment unless that representation has an unsatisfactory effect on routing capabilities. This procedure is followed to avoid creating a geofile with multiple intersection points representing the same physical street intersection. In Figure 5, Schmidt Lake Rd and Fernbrook Ln are represented as they actually exist. However, this representation defines four intersections of Schmidt & Fernbrook (and two of Schmidt & Schmidt). In such situations the dispatcher would need to select from a list of identical intersections. Figure 6 is not the “correct” representation of the intersection, but is much more efficient for dispatchers.

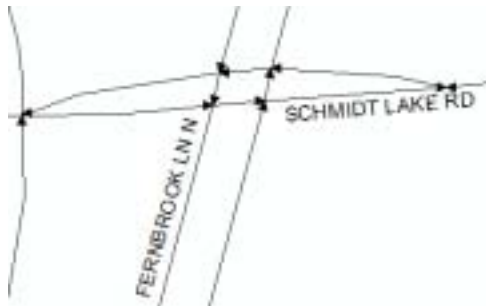


Figure 5



Figure 6

Maintenance considerations

Timely maintenance of the addressed centerline layer and the geofile as a whole is extremely important. The workgroup identified 4 types of maintenance requirements.

1. Immediate attribute change – a street name or address range error or addition that is impacting dispatches to an “active” area. Usually resulting in no address verification.
2. Immediate spatial change – a centerline or boundary error or addition that is impacting dispatches to an “active” area. Usually resulting in an invalid unit recommendation.
3. Non-immediate attribute change – a street name or address range change or addition that is proactive to a new subdivision or other anticipated change.
4. Non-immediate spatial change – a centerline or boundary error or addition that is proactive to a new subdivision or other anticipated change.

Immediate changes are made to the centerline layer within 24 hours of the request. Non-immediate changes are accumulated and added every 30-45 days. These maintenance duties require an average commitment of 15 hours per week.