

**Program Information:** Montgomery County, Maryland  
**Program Title:** An Innovative Way of Using Motor Vehicle Records to Address Buildings  
**Program Category:** # 14, Information Technology  
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### **1.0 Abstract**

The Montgomery County Government, Department of Technology Services - Geographic Information Systems (DTS-GIS) team has developed an innovative method for updating the County's building inventory to provide the Montgomery County Fire and Rescue Service (MCFRS) with useful geographic and attribute information.

The addressing of building footprints makes use of address information from the Montgomery County portion of the State of Maryland, Department of Transportation, Motor Vehicle Administration (MVA) database. DTS-GIS staff uses this database to edit/correct/maintain building footprint addresses for new and existing building footprints. Using the geocoded MVA database layer is more accurate as compared to other data layers, such as the Maryland National Capital Park and Planning Commission (MNCPPC) property addresses or the Maryland Department of Planning Property Points (derived from tax assessor records), because the database contains information on State and County residents who have registered their vehicle(s) and obtained a Maryland driver's license. The address data extracted from the MVA records is part of the registration data that Montgomery County receives annually from MVA.

### **2.0 The Problem/Need for the Program**

The fundamental requirement of the building footprints data layer in support of the MCFRS is that all County buildings (and their addresses) must be present in the County's Computer Aided Dispatch (CAD) system. The County's CAD system is used by MCFRS to dispatch firefighters and apparatus in response to calls for emergency service. The County's process for addressing building footprints via geocoded MVA address points was developed to improve building footprint addresses, and to provide useful geographic information to the participants in a Public Safety incident for display on the CAD's dispatch screen, or in an Automatic Vehicle Locator (AVL) terminal for dispatching and finding an incident. This use of MVA records extends the ability of DTS staff to quickly and efficiently edit/correct/maintain the geographic database building footprint features.

Prior to the implementation of this new process, there were very few references available to DTS-GIS to verify the accuracy and update geographic information for the location of new or existing buildings within Montgomery County. Consequently, DTS-GIS created this new and innovative method to enhance the accuracy and number of options to provide a sophisticated way to allow DTS-GIS staff to quickly update and maintain the building footprint data layer for Montgomery County. As a result, DTS-GIS utilized the MVA data points (derived from MVA addresses) to input an address for a Montgomery County building based on the MVA point location on a road centerline. The method was also utilized to correct information about the building footprint address that was erroneously put on a building initially using property (i.e. land parcel) addresses.

### **3.0 Description of the Program**

The new procedure for addressing the County's building footprints using MVA data was designed and tested on the ESRI GIS software ArcInfo 9.2 platform. After researching and investigating the

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accuracy of this new method, the process was appropriated as a means for DTS-GIS staff to test and validate the building addresses. The following sub-sections describe the process used in this method of editing/correcting and maintaining building addresses.

Step 1: Establish functional requirements

After already geocoding the MVA addresses using street centerlines for the past 10 years, DTS-GIS staff was able to adapt the MVA points provided with the functional opportunity for addressing the building footprints. The method was to provide a reference for building footprint addresses using the location of MVA points, that were initially created using the street centerlines to geocode the MVA addresses. In addition, DTS-GIS staff was able to find a building footprint to update or add information to that location, by using the ESRI geocoding dialog box. Once an MVA point was identified in the vicinity of the building footprint, the address attributes provided were assigned to the correct building footprint. The map layers needed for the method are listed in the Table of Contents panel of the MXD file and can be turned on and off by a check mark.

The MXD file, which is an ArcInfo 9.2 software file, holds the compiled data on one designated PC. The MXD file can be used only from the method administrator's PC so that the most current data is downloaded to the file. The building footprints data provided by the administrator is kept on the hard drive of the administrator's PC for upload to an MXD file that is used on a daily basis for updating the building footprints.

Step 2: Collect data, documents, and information

DTS-GIS, in conjunction with the MVA, is the clearing house for all the needed geographic and attribute data to carry out the process. Geographic data is provided by DTS-GIS in shapefiles. The data items include, but are not limited to, State Department of Planning parcel point (i.e. centroid) records, MNCPPC property polygons (i.e. land parcels) and plat address annotation, DTS-GIS building footprint polygons, street centerlines (CLINES) and lastly, the CLINE geocoded MVA points. These data layers are updated at the various intervals by the responsible agencies and downloaded quarterly and then go through quality control checks. These GIS data layers are useful geographic references for the displaying, updating and maintaining of building footprints. Detailed process instructions and pictures were provided in hard copy format for easy reference.

Step 3: Research and investigate use of MVA points

The method utilizes the geocoding capability provided by ESRI's ArcInfo 9.2 software. ESRI's ArcInfo 9.2 software was used to display the centerline geocoded MVA points to be then analyzed for which building the MVA address is attributed to. The method was utilized on a Dell Precision 690, Xeon PC with Microsoft Windows XP.

The method interface is generated by ESRI's ArcInfo 9.2 geocoding dialog boxes and simple displays of data layers to enable DTS-GIS staff to quickly and easily review the results of the geocoding.

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Figure 1: Where Maryland Property Points has only one address point for the multi-unit development, the geocoded MVA points provide information to fill in the blanks. 11 addresses were present in the MVA vehicle registration file.

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Figure 2: Where the M-NCPPC Master Addresses do not accurately address building footprints, the geocoded MVA points accomplish the task. Only one 'Master Address' address exists for this multi-unit complex, whereas 17 addresses were present in the MVA vehicle registration file.

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Addressing the building footprints using the geocoded MVA points was a method used to quickly update and edit building footprint addresses and then display their changes. The method includes displaying current orthophotos to show any new building footprints not yet shown on the building footprint layer. In addition, DTS-GIS staff also has the option to conduct a more comprehensive search based on a query of an address to work in more specific areas of the County that are quickly constructing new buildings.

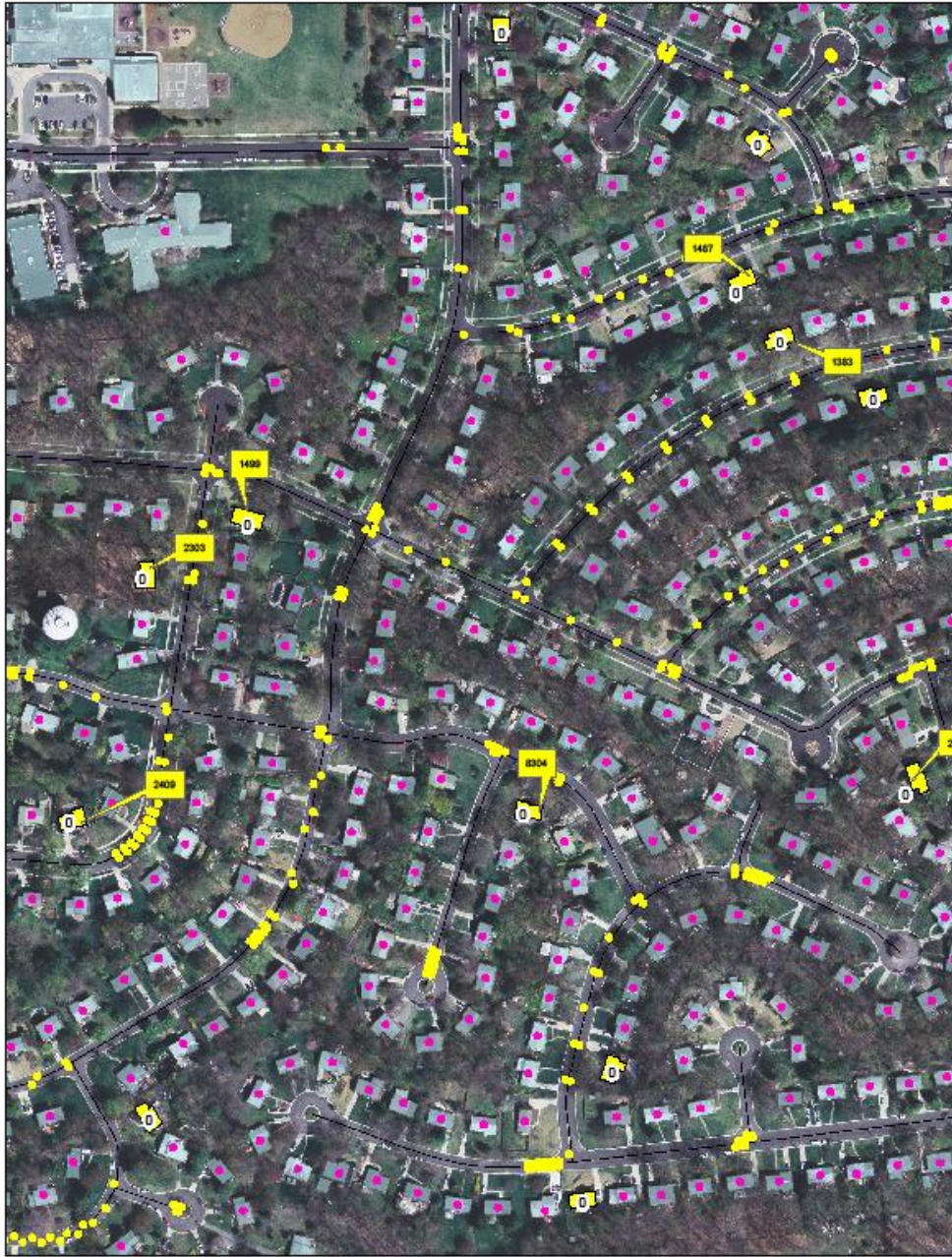


Figure 3: Display of CLINE geocoded MVA addresses in yellow (candidate addresses) demonstrating the ability to address building footprints

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Step 4: Review and revise method

DTS-GIS staff reviewed and developed improvements to the method between January and May of 2007. The findings were incorporated into the method by a DTS-GIS staff member and were implemented by DTS-GIS in May of 2007.

Step 5: Maintain method content

The CLINE geocoded MVA points for Montgomery County is a product of the annual processing (i.e. geocoding) of the MVA registrations (for the County's Department of Finance) pertaining to the County. The data is then reviewed and prepared for use in the method by a DTS-GIS staff member. The method content including GIS shapefiles, building data and street centerlines are updated quarterly by DTS-GIS staff. The system administration of the application is also provided by DTS-GIS.

**4.0 Use of Technology**

The method was created and tested on a Montgomery County Government DTS-GIS Xeon PC with Microsoft Windows XP 2GB RAM running ESRI's ArcInfo 9.2 software. ESRI's ArcInfo 9.2 MXD file was used as the method development environment to design, and test accuracy of the method.

**5.0 The Cost of the Program**

The total cost to develop the DTS-GIS method including staff time (programming and data maintenance) and software/hardware equipment was approximately \$7,000. Approximately 40 hours of staff time was invested into the development of the application at a cost of \$1,250. The ArcInfo GIS software costs \$7,295. However, this specific copy of the license also performs other GIS functions.

In order for the DTS-GIS staff member to use the method, a high-end PC workstation with processor 2.8 GHz or better, 1 GB of RAM, and the high speed SCSI disk drive (15,000 RPM) was required. Large capacity RAM will reduce caching and thus speed up the geocoding of a typically large amount of CLINE geocoded MVA data layer (with 700,000+ points). A high speed disk drive is vital for the adequate performance of the editing sessions. Such a high-end PC workstation would cost about \$4,000. A standard County fiber connection to the Internet through Microsoft Internet Explorer should satisfy the needs of staff attempting to use a similar method.

**6.0 The Results/Success of the Program**

This new and innovative method grew out of a need to update and maintain the building footprint data layer in order to provide the County's Fire and Rescue Service a building data layer that displays addresses and to have on hand a quick reference to PDF files of building floor plans. Thus, the need for auditing the method was evident. The performance of the DTS-GIS method will be evaluated by MCFRS staff looking for missing addresses using Public Safety third party software to measure the number of buildings the method has missed by the DTS-GIS staff assigned to the project.

The positive results of this application consist of a simple and uncomplicated way for DTS-GIS staff to maintain, update and edit the important geographic information needed to respond to an

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emergency. The method will reduce the demand on DTS-GIS staff time in responding to the inquiries of the MCFRS staff in connection to data maintenance.

**7.0 Worthiness of an Award**

The DTS-GIS method of addressing building footprints provides DTS-GIS staff with tools to search, display, edit or update geographic building information in seconds rather than hours for any building in a database with close to 300,000 buildings. The data links between floor plan PDF files (for fire fighters' use) and their corresponding building footprints, made possible by the addressing of building footprints, allow the first responders to quickly retrieve the pertinent floor plans. Such floor plans tell the locations of such vital information such as standpipes, hydrants, stairwells, and fire escapes. Once fully deployed, this mode of data access will replace the need to manually flip through the map-book pages of floor plan binders for a particular building, thereby resulting in a significant savings in first responders' time and minimizing the loss of life and property.

The addressing of building footprints in this fashion makes use of the latest MVA records for updating the building footprints. The annual GIS processing of the County's portion of MVA registration records has, for the past 10 years, focused on safeguarding the County's proper share of highway related revenue sharing. Facing the challenge of providing complete and accurate building addresses for first responders, DTS-GIS makes use of this geocoded MVA registration address points. As a result, a substantial number of buildings that were without addresses previously have since been successfully addressed with the help of this data source. This is indeed an innovative and economic way of data maintenance as compared to the traditional way of addressing building footprint data using property centroids or land parcel addresses, which are both less accurate, more time consuming, and more costly.

Although there may be other jurisdictions that maintain this kind of geographic database, Montgomery County is one of the first few local governments to develop this kind of GIS data service for its Fire and Rescue Service. The DTS-GIS Addressing Building Footprints method serves as a model for other Counties and municipalities who provide geographic data and information to their public safety planners and operation supervisors or managers.