

Mobile GIS in Police Vehicles for Henrico County, Virginia

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Abstract:

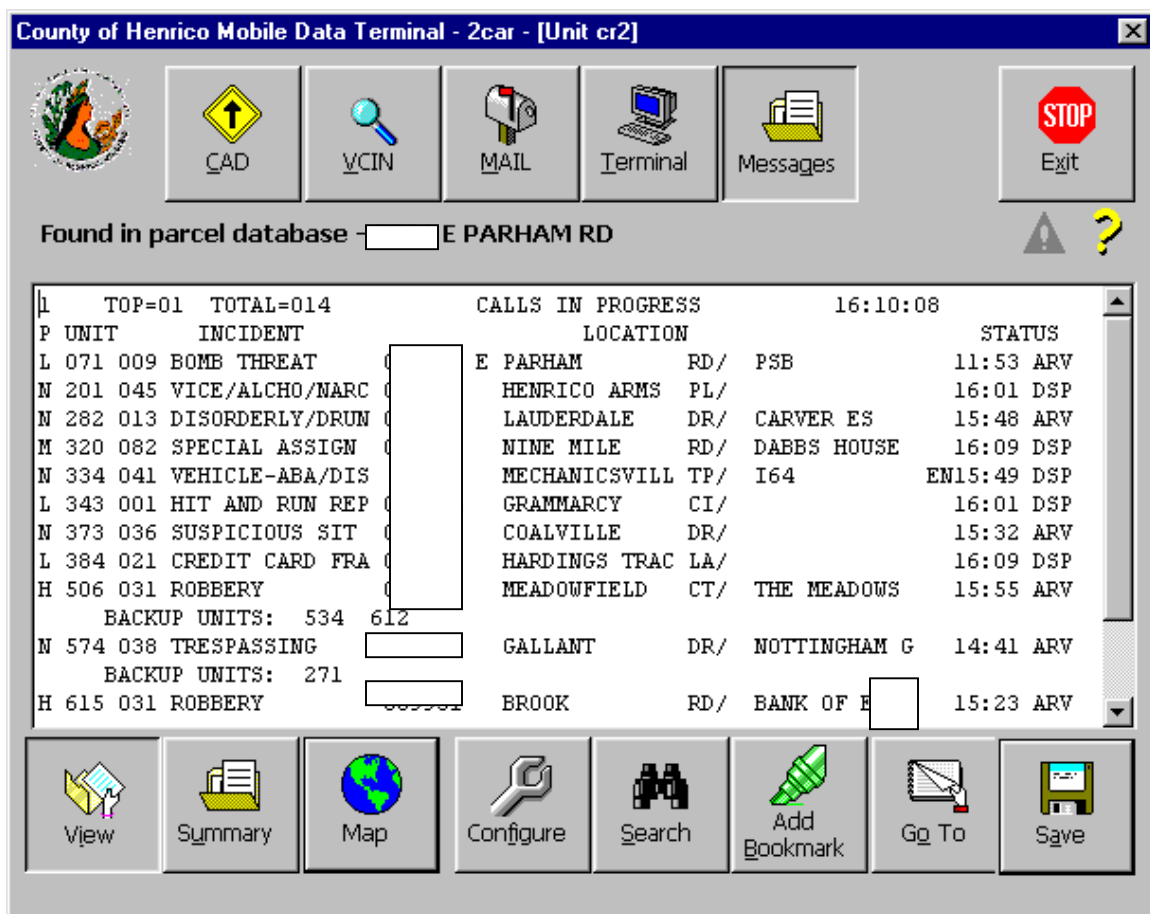
The County of Henrico, Virginia is a municipal suburban locality with a population of about 265,000 people. In order to support public safety and homeland security efforts, the County's Division of Police, Department of Information Technology, and the GIS Office deployed an ESRI MapObjects solution in the County's Public Safety vehicles, including all 490 police cars and all emergency response mobile command vehicles. GIS layers, including cadastral, planimetric, digital orthorectified aerial photography, and road centerlines with address ranges are loaded in the mobile computers docked in each vehicle. This is integrated with the mobile dispatch information system with a MapObjects solution that geocodes emergency calls and provides comprehensive planning and response capabilities to field officers.

Henrico County, Virginia covers an area of about 242 square miles and is part of the Richmond Metropolitan Area that is home to over 1 million people. The County's real estate base is made up of just over 100,000 parcels while there are over 72,000 water customers and over 78,000 sewer customers. While Henrico County is a locality adjoining the city of Richmond, it has a wide variety of land uses from high density residential to wide-open agricultural fields. The wide variation in land uses in the County cause a considerable challenge to public safety agencies. This is compounded by the location within the County of the Richmond International Airport and the Richmond International Raceway. These two facilities cause a considerable volume of visitors to traverse the County on a regular basis.

The County has been implementing a detailed and highly accurate Geographic Information System (GIS) program. The focus of this is to enhance the level of service delivery and increase the efficiency of County agencies. The GIS program started in 1998 and it includes accurate planimetric base map layers that are controlled by an extensive geodetic control network. The functionality of the GIS has been successfully deployed in many County agencies, including Planning, Real Estate Assessments, Public Works, and Recreation and Parks. It has been a desire of the County to extend the functionality of the GIS to field personnel.

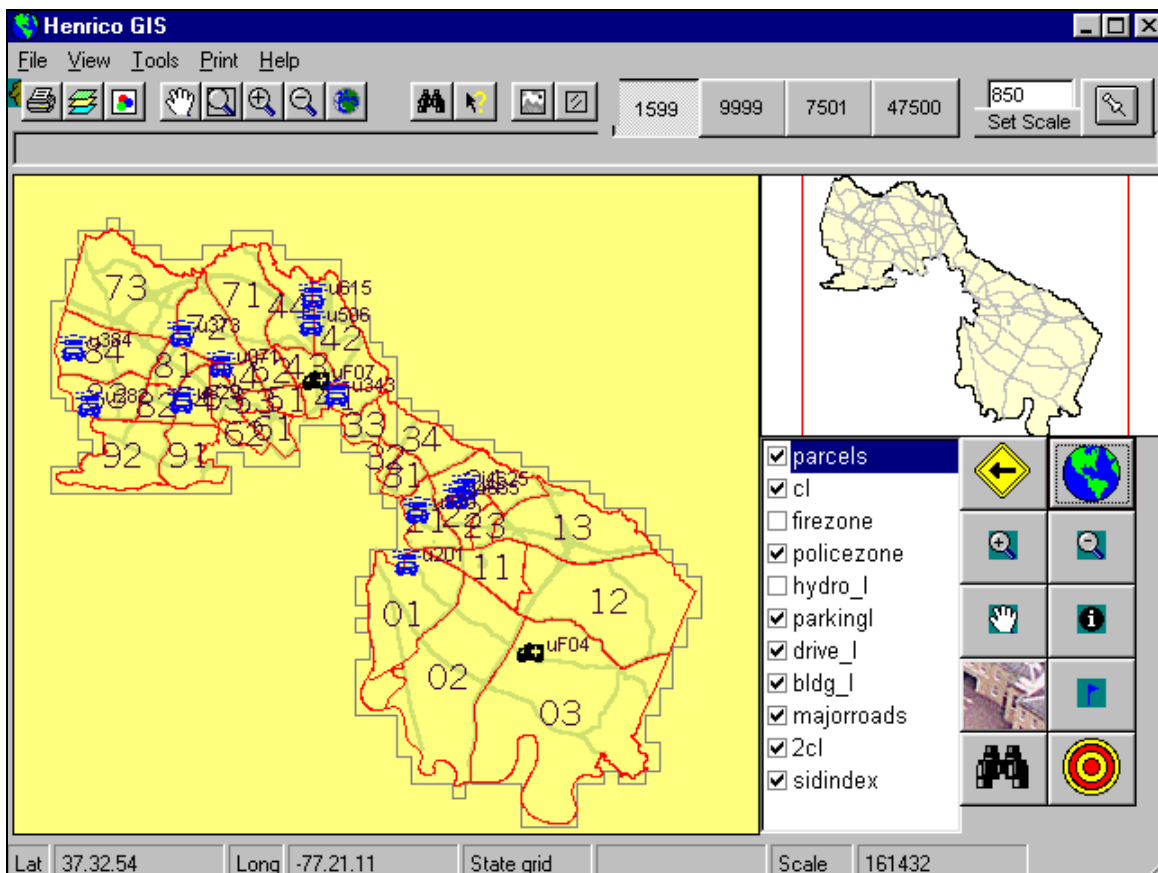
During the Summer of 2002, the County deployed a mobile GIS solution based on ESRI's MapObjects software toolset. This application makes it possible to embed general GIS functionality into the County's mobile dispatch information resources. The County has deployed mobile laptop computers to all police officers. The laptop computers function both in and out of the patrol car and utilize wireless technology for dispatch and messaging. Additional units have been deployed in mobile command and response units, and certain fire apparatus. The dispatch information generated in the County's Communication Center is transmitted to the mobile units via CDPD or Mobitex wireless technology. The mobile computers have CDPD or Mobitex modems that receive the information and display it on the officer's computer screen. The County is planning to migrate from CDPD and Mobitex to the newer CDMA wireless technology before the end of 2004.

The information provided by the dispatch system gives officers in the field an overview of calls pending, as well as the individual status and other related information on each call. Officers can use the mobile dispatch system to respond to calls and to receive information about an emergency without needing to use the voice radio. This system provides officers with the address where the call was originated, as well as the relevant cross street names as shown in this figure (note: confidential information has been blocked in all figures in this article).



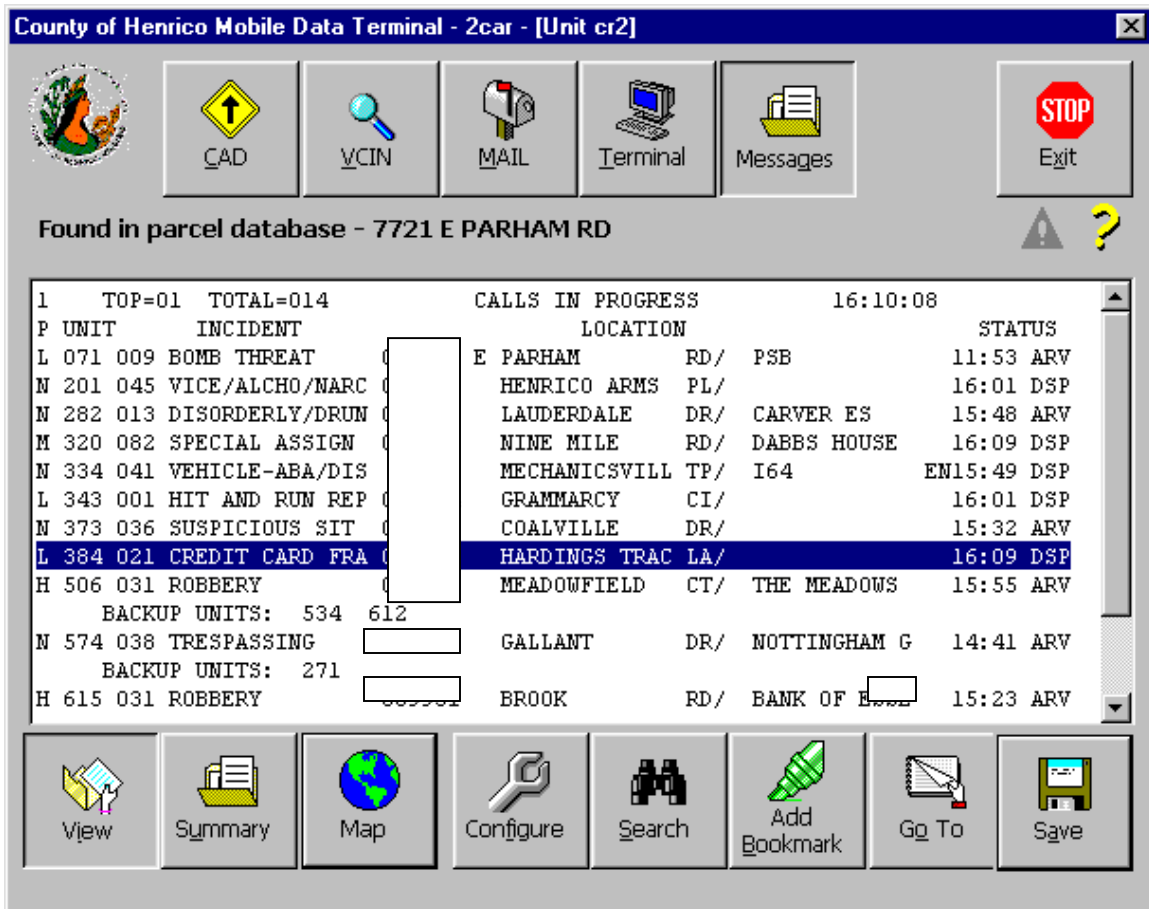
The County deployed an ESRI MapObjects application that can accept the address information from the mobile dispatch information to geocode the location of the call. In this way, the officer touches the “Map” software button on the touch screen display to

pass the address information to MapObjects. The address is geocoded against the County's own road centerline layer with exact address ranges. The application provides the officer with an interactive map plotting the locations of calls. The officer has the ability of performing basic GIS functions, such as pan, zoom, and basic identification queries. The mapping application has been specifically designed to be touch screen friendly and provides large command buttons. It also has features such as touch-and-drag zoom to make it easy to use with one hand.

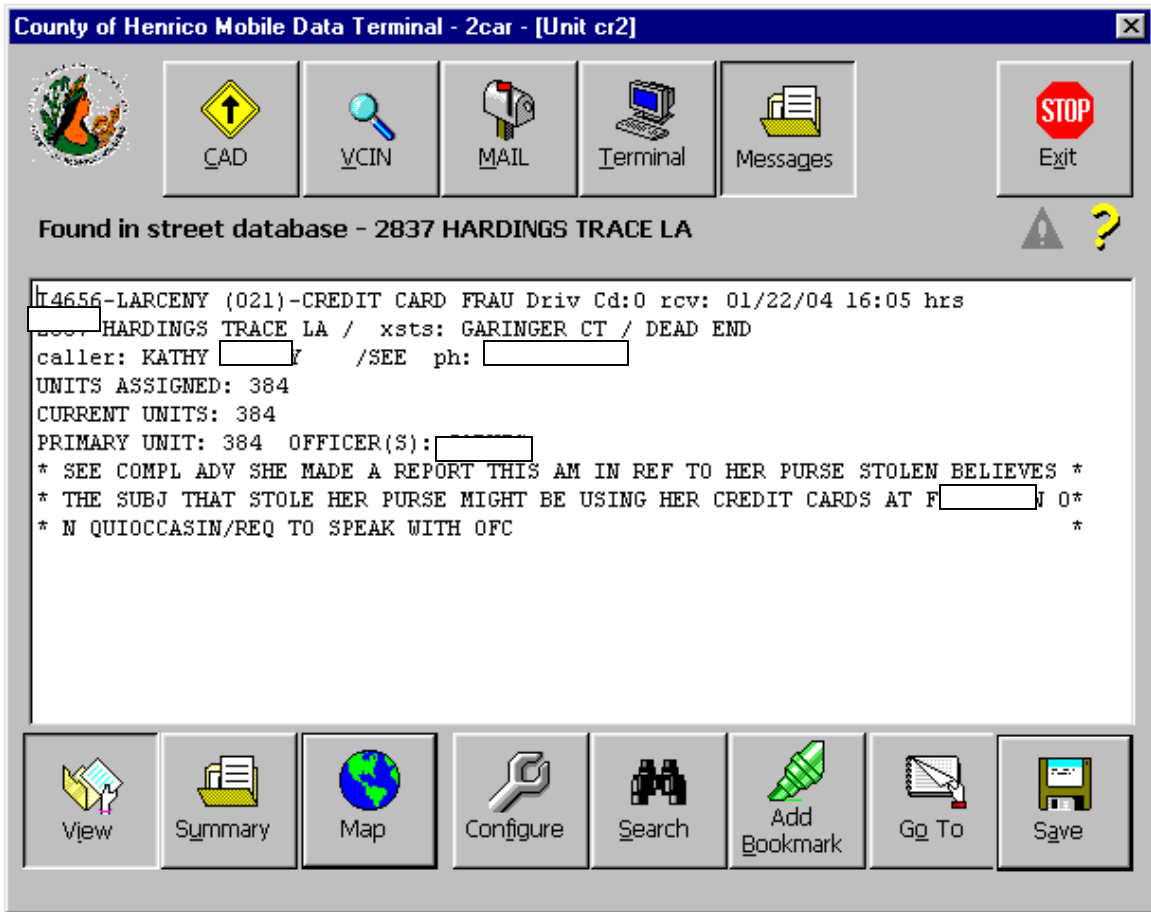


Through the use of this technology, field officers have one-touch call mapping capability. This allows the officer to plan their response route. This enables officers to quickly and easily see the location of the call. The GIS layers include detailed planimetric, cadastral,

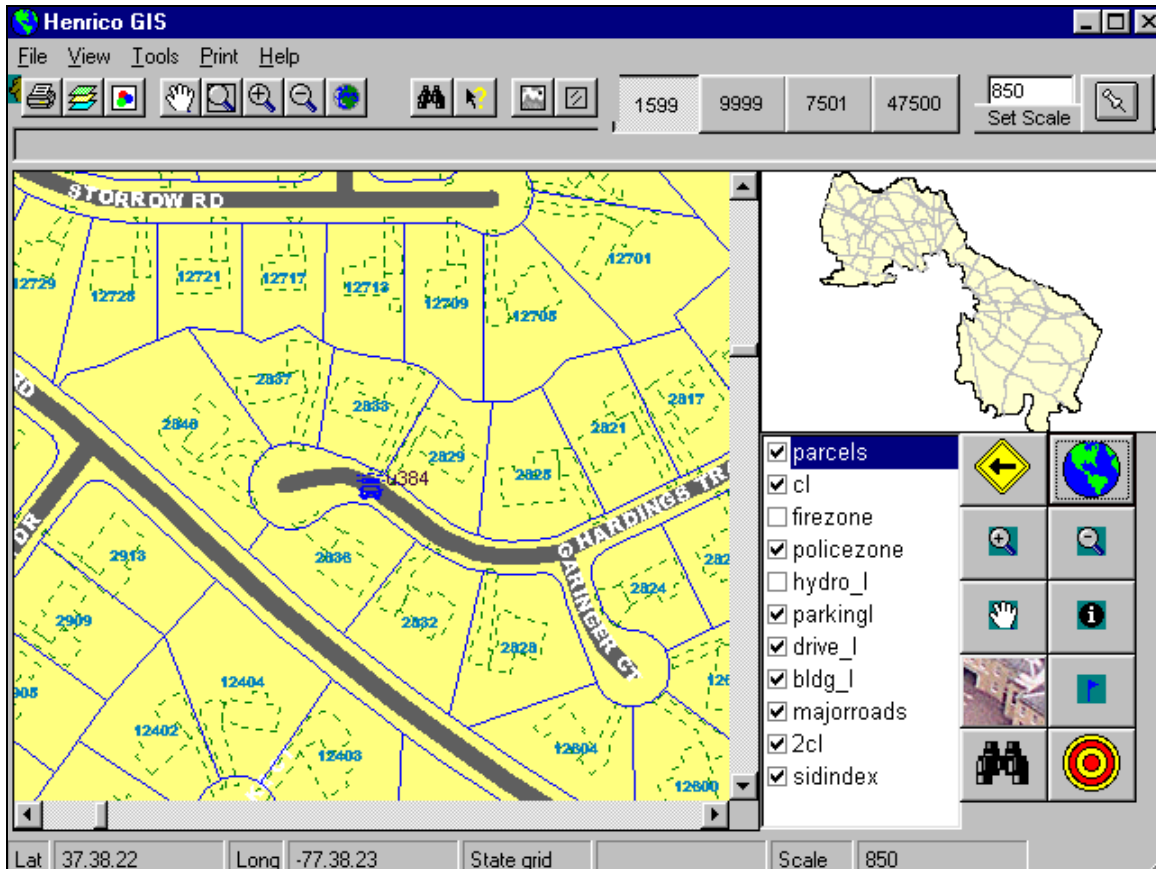
and administrative layers, in addition to the County's color digital orthorectified aerial photography. This level of detail and accuracy gives officers the ability to plan their response and become fully informed of the lay-of-the-land of the location to where they are responding to a call. The systems functionality also gives officers the ability to perform basic GIS queries and analysis.



In the figure above, the officer in unit 384 uses the mobile computer's user interface to select the call for service that has been assigned to him or her. The tool allows for additional detailed status information to be displayed on the mobile data terminal as shown in the figure below:

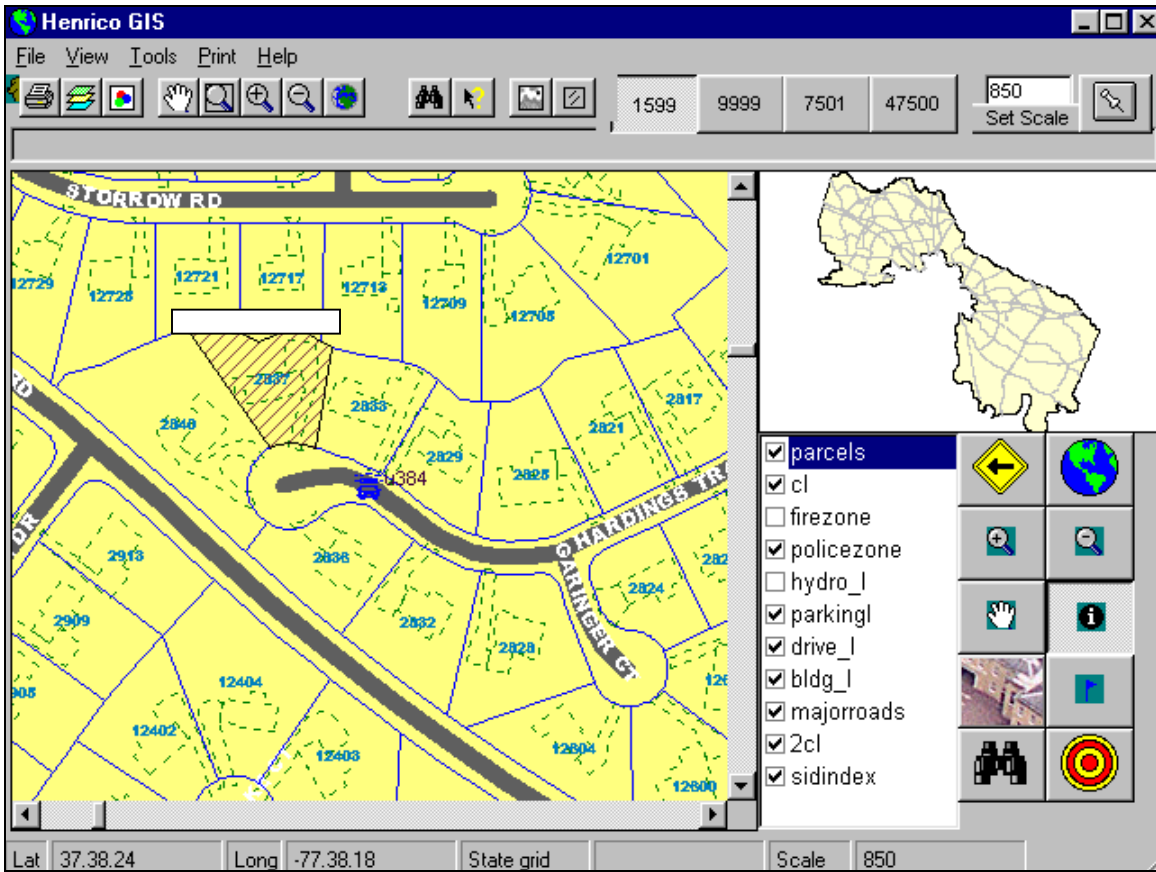


The officer can click on the “Map” icon to display the location of the call in the Map Objects Application as seen in the next figure. Additionally, whenever a call is assigned to an officer, information similar to that shown above is automatically sent to the officers mobile computer by the dispatching system. In order to view this on the GIS screen, the officer just has to touch or click on the “Map” icon. The GIS will display the location of the call and will automatically center the map to that location.

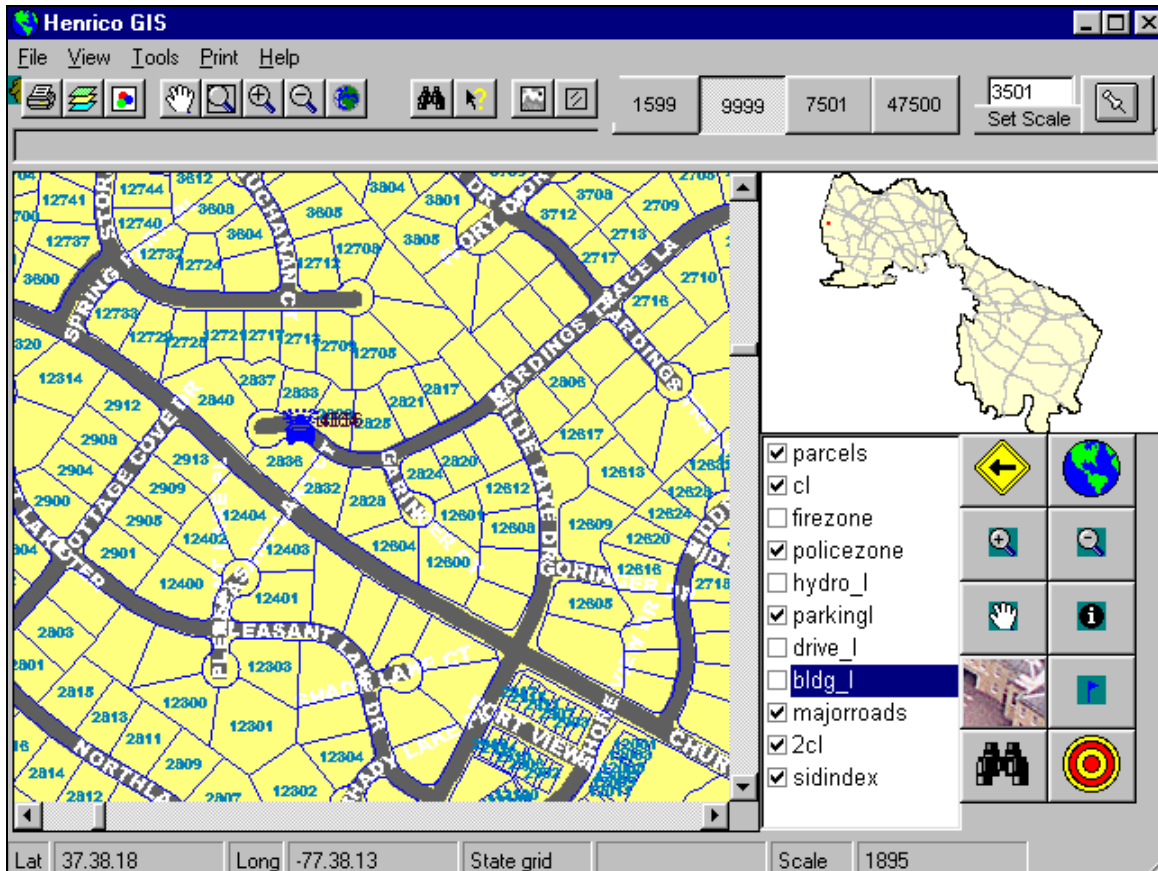


The GIS information used in this application is stored locally in the mobile computer's hard drive. This information is refreshed periodically to ensure that the officers have current information available. The wireless communication is used to transfer the text-based dispatch information to the mobile dispatch module of the application. The address portion of the text string is supplied to MapObjects for geocoding of the incoming calls.

The officer can use the identify function of the mapping application to interactively select a real estate parcel on the display and obtain attribute information for that parcel as shown in the next figure.



The mapping interface allows the user to customize the view by allowing certain features to be added or removed from the display. This also allows for display at pre-defined or user-specified scales as shown in the next figure.



Finally, the officer is also able to display the County's digital orthorectified aerial photography as shown in the next figure. This aerial photography images are available for the entire county in a pair of MrSID mosaics format that are stored locally at the mobile data terminal.

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