

Deliver and Return of Voting Supplies In Maricopa County, Arizona

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Abstract

For each election the GIS Section of the Elections Department must retrieve polling place information, locate polling places, determine routes, and generate route maps and route manifests. Prior to GIS, the maps were constructed by copying sections of a large map and marking the polling place locations by hand. Once GIS was established in the department, the route maps were individually constructed in ArcView 3.x. In 2002, the process was automated in ArcGIS through ArcObjects and Visual Basic. An intranet web page was created as well to automate the process of creating the manifest lists. The route application is transitioning to SQL Server and VB .NET.

Background

The Maricopa County Recorder/Elections Department administers nearly continuous election cycles for the 1.7 million registered voters in the County. GIS has been able to aid the department with many of its Pre-Election planning tasks such as polling place locating, delivery routing, voting precinct splits, and mapping troubleshooter areas. The planning relies heavily on gathering and formatting the polling place/facility information from SQL Server, mapping the information, and keeping the information current since a single change will affect all of the other applications. The deliver and return of voting supplies is one of the applications most in need of enhancements. Although the current application is helpful, the application is still burdensome to maintain and setup for each election. The route application is transitioning to SQL Server, VB.net, and ArcIMS for the Fall 2005 Elections. The new application will simplify a once complicated and labor intensive process.

Data

Originally, the information used for delivery supplies consisted of paper reports derived from SQL Server. Once the staff became familiar with Microsoft Excel, the delivery reports (manifests) were typed into Excel. As GIS became established in the Department, the GIS Section tried to aid the staff with the labor intensive tasks of gathering data and generating maps for over 1,000 polling places.

Through a series of queries, joins, and static tables, the GIS Section was able to extract the information needed for the manifests directly from the database and avoid any human data entry errors. However, the process was still long and cumbersome. The data still needed to be copied, pasted, and formatted in Excel. If a polling place was modified, added or deleted, the process would have to be restarted.

In an effort to automate the process of converting the data to Excel, an intranet application was developed using classic ASP. The intranet application dramatically

reduced the time it took to generate the lists. However, the process was still quite a bit of work to update and maintain when changes occurred. To streamline the processes and make the data more dynamic, the application was converted to SQL Server and ASP .Net, see Figure 1. A delivery route table was created in SQL Server as well as queries for data access. The newly created route table contained information such as day, route, and stop which did not exist previously in the database. The route table could then be joined to the other three tables needed to construct the manifest and dynamically display the information through the ASP .NET application. Any modifications to the database could then be reflected to the user in real-time.

Maricopa County Elections Department
Deliver and Return of Voting Supplies

Election Date: 05/17/2005
 Route: 5
 Delivery Date: 5/10/2005
 Pickup Date: 5/18/2005
 Total Eagles: 13

[Excel](#)
ELECTIONS 506-5544 or 506-3420

EGE	NOTES	RT	PRECINCT	POLLING PLACE	ADDRESS	CITY	LOCATION	PHONE #	TBR	CH	RMP	MACHINES(5)
1		5	6396	MESA FIRE STATION # 4	1426 S EXTENSION RD	ME	ROOM	(000)-000-0000	0	0		
2		5	6395	LONGMORE ROAD BAPTIST CHURCH	00554 S LONGMORE	ME	FELLOWSHIP HALL	(480)-964-4013	0	0		
3		5	6394	TONGAN UNITED METHODIST CHURCH	00301 N LONGMORE	ME	FLWSHP HALL	(480)-655-8323	0	0		
4		5	6380	PARKWAY BAPTIST CHURCH	00745 N ALMA SCHOOL RD	ME	FOYER	(480)-969-0491	0	0		
5		5	6382	MESA HISTORICAL MUSEUM	02345 N HORNE	ME	AUDITORIUM	(480)-835-7358	0	0		
6		5	6383	FOUNTAIN OF LIFE CHURCH	01718 N MESA DR	ME	FELLOWSHIP HALL	(480)-964-1083	0	0		
7		5	6381	CENTENNIAL VILLAGE CORPORATION	00130 W BROWN RD	ME	DINING ROOM	(480)-833-6036	0	0		
8		5	6400	FIRST PRESBYTERIAN CHURCH	00161 N MESA DR	ME	FELLOWSHIP HALL	(480)-964-0606	0	0		
9		5	6384	WORD OF GRACE	00655 E UNIVERSITY DR	ME	LOBBY	(480)-464-3991	0	0		
10		5	6402	PROGRESSIVE BAPTIST CHR	00761 S HORNE	ME	SOUTH HALL	(480)-252-6228	0	0		
11		5	6401	MESA CHURCH OF CHRIST	01223 E DANA AVE	ME	FELLOWSHIP HALL	(480)-964-1743	0	0		
12		5	6387	ST LUKES LUTHERAN CHR	00007 N STAPLEY DR	ME	PARISH HALL	(480)-969-4414	2	0		
13		5	6385	MACARTHUR SCHOOL	01435 E MCLELLAN RD	ME	BAND ROOM	(480)-472-7805	0	0		

NOTES:

Manifest Generated 5/27/2005 11:52:43 AM

Figure 1. Route Manifest

Maps

In the beginning, each polling place location was marked by hand on a paper map. The paper map was comprised of section of a large map which had been copied. To aid the mapping process, the GIS Section was able to locate the polling places through geocoding in ArcView 3.x. The fastest route to deliver the supplies was created using the Network Analyst extension. A new layout was created for each route. However, in a fast growing county, polling places tend to change frequently. ArcView 3.x was able to significantly improve the overall process, but the maps were still made individually and changes were still a burden.

To reduce the amount of time and workload involved in creating each individual route map, the process was automated in ArcGIS. Using Visual Basic and ArcObjects, the custom application drastically reduced the time it took to create the maps. The ArcGIS application allowed the user to create maps for all the routes or only select routes. Once the routes were determined, the application would determine the extent of the route and zoom to the calculated extent. Through querying the geometry of the route, the application would use either the portrait or landscape template. The application would also change the Title of the map document to reflect the current route as well as update the date. The final result of

the application was an Adobe Acrobat PDF of the route (Figure 2) as well as a print out. The PDFs were hyperlinked to the classic ASP Delivery Route application so staff was able to access any and all maps needed at any given time.

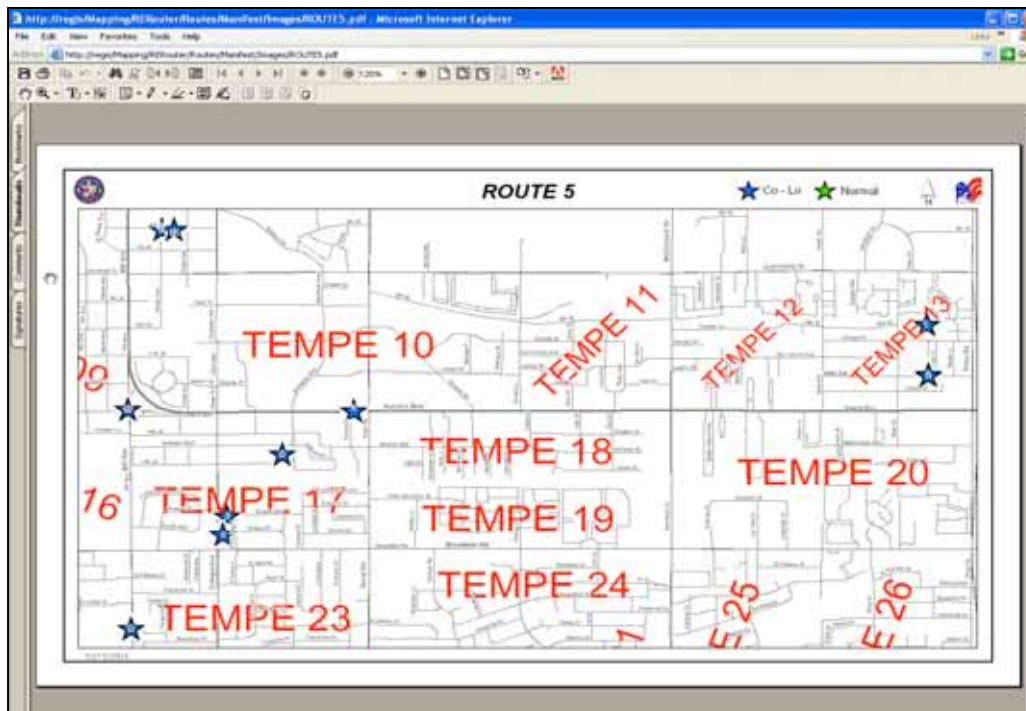


Figure 2. Route Map

Automating the delivery route maps was a huge step forward, but still was not quite as efficient or dynamic as needed since polling places change frequently and the maps would need to be redone. To solve this dilemma, the new .NET route application references a dynamic link library (.dll) which returns the x and y coordinates for the polling place based on the address information passed. The information is then passed to ArcIMS to map the route instead of displaying a PDF of the route. Therefore, when a polling place location changes in the future, ArcIMS map will display real-time changes to the database. This new change debuts in September of 2005 and will complete the Elections Department overhaul of how the routes are managed.

Conclusion

Over the years, GIS and technology have drastically simplified a once complicated and labor intensive process for the Elections Department. The use of .Net and ArcIMS have allowed the GIS Section to better serve fellow coworkers as well as the public by displaying real-time data and reducing the time needed to complete Pre-Election planning tasks such as the delivery and return of voting supplies.

Acknowledgements

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