

Title: Easy Web-Based Data Editing Using ArcIMS – Indianapolis Department of Public Works

Authors: Joe Watson, Matt Faulkner, Jeff Albee

Abstract: From addresses and ZIP Codes to coordinates and countries, the majority of data has ties to geography. However, much of our data continues to be presented in a non-geographic format, through spreadsheets and other tabular databases. We have not harnessed the potential of geographic data because of cost, ease of use, and unfamiliarity with its applications. Changing the way we create and edit data to include Geography begins at data entry, which means it must be easy for all users. Using ArcIMS, the City of Indianapolis Department of Public Works has taken GIS data editing to the front lines. All Public Works Staff members have access to create and edit geographic data with ArcIMS and ArcSDE in an easy-to-use and familiar interface, a Web browser. This paper will discuss implementing ArcIMS as a department-wide solution to creating and distributing geographic data.

Authors: Joe Watson, Matt Faulkner, and Jeff Albee

Introduction

Located in the heart of Indiana, Indianapolis is the States' largest city. Growing at a rate of over 15% per year over the past 10 years, Indianapolis finds itself amongst similar cities trying to maintain existing services while utilizing shrinking budgets. The City of Indianapolis is home to a population of over 850,000, containing more than 350,000 tax parcels located along 3,100 miles of road.

In the spring of 2004, the City Department of Public Works (DPW) decided to track all of their Capital Improvement Projects (CIP) graphically, moving away from their Microsoft Access based system that only provided the user with text based information. By changing over to a graphically based system, users can access projects visually in a real time environment on a citywide map.

The Indianapolis Department of Public Works in conjunction with AMEC Earth and Environmental created an easy-to-use web-based CIP Project Tracking System that supports "query-only" users as well as editing "power users". The City of Indianapolis DPW staff interactively locate, draw, and edit CIP projects, stored in ArcSDE, using an ArcIMS website. DPW staff draw and edit the geographic CIP project location on the map as part of the project data entry/edit process.

The decision to utilize a web-based application promised a number of benefits to the DPW. Because it is a web application, there would be no need to visit each desktop to install software, furthermore all data is embedded in the browser during configuration, so the users do not need to locate the datasets from the various sources.

The web interface was specifically designed to look and feel like the existing interface; this decision had resulted in decreased "learning curve", and has resulted in a more simplified transition with minimal application training.

While easy to learn and use, the browser is flexible and powerful enough to create customized maps, and being a web-based product, it is available to any City employee with access to a computer with Internet Explorer. This increases the usage and return on investment for the data capture and system infrastructure.

In addition to editing geographic and tabular project information the CIP Project Tracking application contains numerous reporting and printing functionalities. Reports such as the "Project Overlap", "Project Address", and "Excluding Studies/Non-Bid" utilize tabular and geographic data make DPW staff at every level more efficient and informed. The CIP Project Tracking also contains functionality to generate mailing labels for construction notices by using

buffers to select sets of land parcels and exporting their property owner and address information to a notification list.

In order for the website to be a valuable tool, all layers available from The City of Indianapolis GIS Department (Geodatabase, Shapefile, and Raster) have been added to the site. With the ability to turn layer on and off so users can create a custom view.

Search functions have been configured for all fields within the GIS layers. The most common searches are available, such as Parcel Number, Street Name, Property Owner and Project Number. In addition to the basic searches, there are also more advanced searches. The most used feature is the Search by Address function where the user can enter the full property address to find a location. For power users, there are built in queries to show projects that have been entered without a geographic location.

Along with the GIS data, the application also pulls tabular project data from an Oracle database. The data includes items such as project manager, start and end dates, contract information; budget tracking and location information pulled directly from the GIS layers. This data is seamlessly joined to the spatial data to create a unified picture of the CIP data.

Technical Architecture and Performance

At the City of Indianapolis, GIS and Information Technology are centrally supported from within the Information Technology Services Division (ITS). The CIP Project Tracking application utilizes existing hardware, software, and expertise in ITS, such as networking, data and web servers as well as database administration.

The CIP Project Tracking Application runs on ArcIMS 9.0 and receives Geographic data from an ArcSDE dissemination database maintained separately from the production database, thus allowing query-only tuning and lesser downtime. ArcSDE runs with Oracle 9i, and all data housed in a mass storage array. Replication software is used to synchronize the warehouse with the production database.

Figure 1.0 Current System Architecture

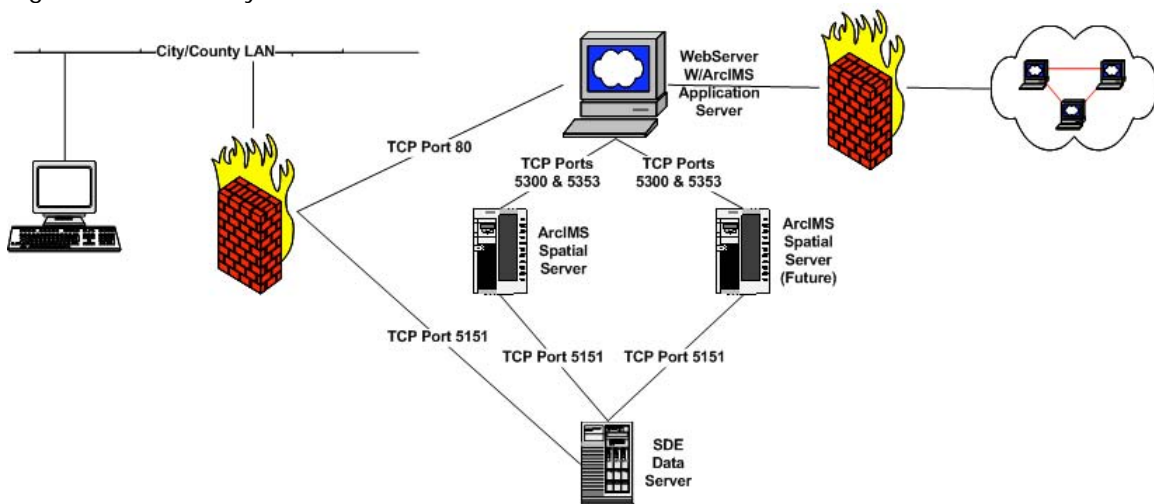
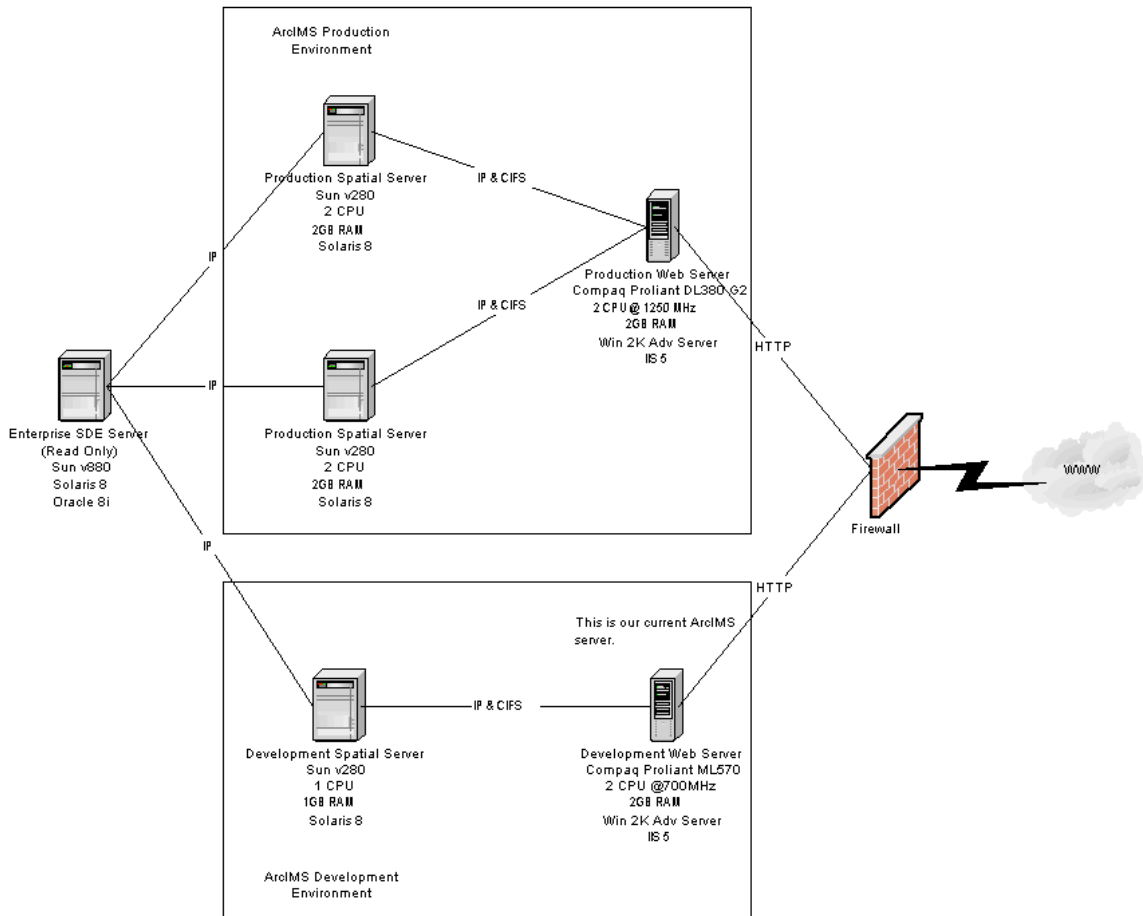


Figure 1.1 Current System Architecture



Users within Indianapolis DPW

Primarily DPW staff uses the CIP Project Tracking application. All internal users have the ability to edit and create projects, while some external users only have the ability to view the data. Currently that are approximately 75 daily users, however this number is expected to increase significantly as staff and other divisions become more familiar with the system. Five divisions within the City Department of Public Works will make use of the Web-GIS solution including Transportation, Environmental Engineering, Operations, and Sewer Maintenance.

Case Study – Mailing List Buffer

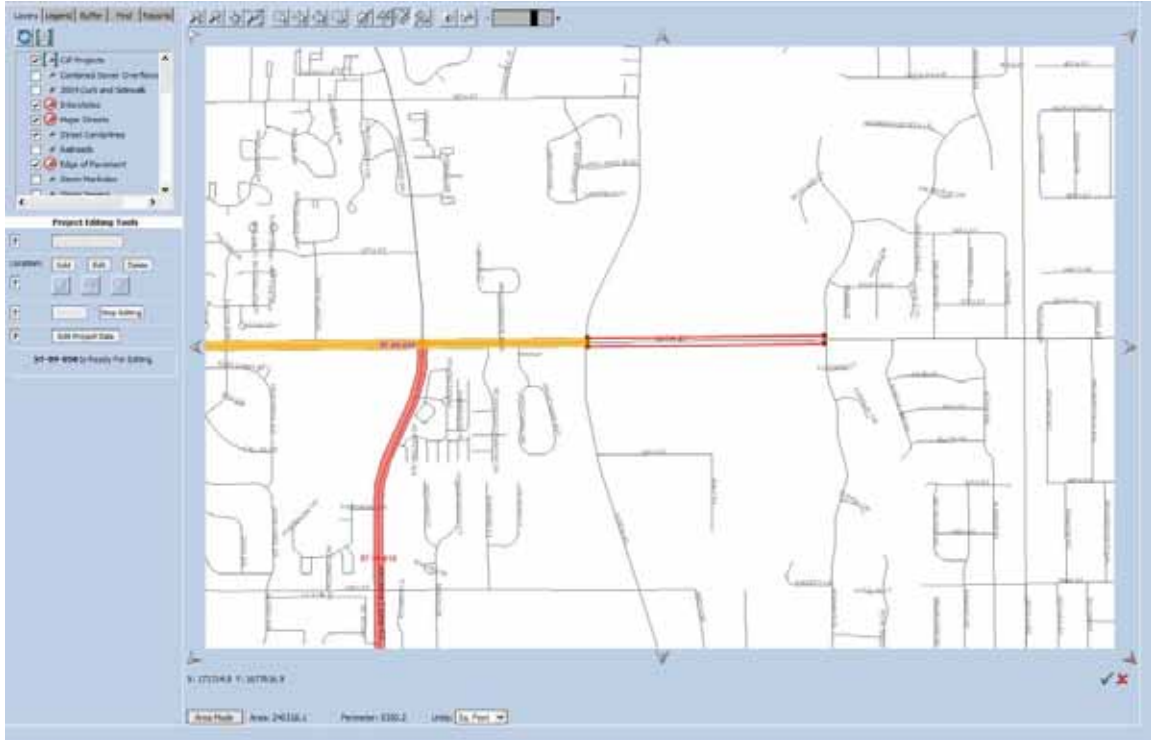
When a new project is starting, DPW wanted an automated way to provide notice to the affected customers. With the new tool, a buffer can be used to create this notification list. The buffer area can be created about the project polygon while selecting the results from the parcel layer to provide the addresses. At the top of the results table is the option to export to Excel for use with a mail merge to create mailing labels.

The screenshot shows a GIS application window with a map and a Microsoft Excel window. The map displays a red buffer area around a project polygon. The Excel window shows a table with the following columns: PARCEL TAG, PARCEL F, PARCEL C, LOTNUM, SUBDIVISION TAG, SUBDIVISION NUMBER, PRO. OR, STREET NAME, and SUFFIX. The table contains 22 rows of data.

PARCEL TAG	PARCEL F	PARCEL C	LOTNUM	SUBDIVISION TAG	SUBDIVISION NUMBER	PRO. OR	STREET NAME	SUFFIX
2001108	2001201	2001201			6001		KENTUCKY AVE	
2002004	2004111	2004111			6030		MENCKENHALL RD	
2002014	2004112	2004112			6030		KENTUCKY AVE	
2011028	2011008	2011008			1108		MENCKENHALL RD	
2005010	2005134	2005134	20		0821		BAR DEL WDR	
2005027	2005111	2005111			0820		KENTUCKY AVE	
2005030	2005109	2005109			0847		KENTUCKY AVE	
2005110	2004484	2004484			0827		MENCKENHALL RD	
2005448	2005176	2005176			0741		KENTUCKY AVE	
2005108	2005107	2005107	20		0811		BAR DEL WDR	
2005014	2005147	2005147	3		0810		BAR DEL WDR	
2002442	2004088	2004088	18		0723		BAR DEL WDR	
2005964	2007600	2007600			0500		MENCKENHALL RD	
2005965	2007130	2007130	24		0732		MENCKENHALL AVE	
2007117	2002062	2002062			0848		MENCKENHALL RD	
2005000	2004770	2004770			0709		MENCKENHALL RD	
2005039	2005132	2005132			0821		KENTUCKY AVE	
2005172	2003384	2003384			0717		MAYHOUSE RD	
2005011	2002184	2002184			0401		SHOGG CREEK LN	
2005044	2007100	2007100			0300		MENCKENHALL RD	
2005000	2011410	2011410			0411		BEANBOW WAY	

Case Study – Editing Project Area

Previously there have been hardcopy maps printed that are out of date as soon as the map is printed. With the new system, the projects can be edited in real time. This can be useful if there is a project that is under budget and can be extended to make use of the extra. For example, a paving project that is under budget could be extended for another city block. With the new system, the project manager can edit the polygon to graphically represent the change in project location.



Conclusion

While the web browser is currently available through the Intranet, the City plans to obtain approval to provide Internet access with limited functionality in the near future. The CIP Project Tracking tool has added Geography to the data entry process and, more importantly, has made it easy for all users to create and edit GIS data. The City of Indianapolis, as a result, has provided their staff with a valuable tool to improve efficiency and help users make more informed and better decisions.

Author Info:

Joe Watson
Senior Project Manager
City of Indianapolis Department of Public Works
604 North Sherman Dr
Indianapolis, IN 46201
(317) 327-5357
(317) 327-2334

Matthew Faulkner
GIS Project Manager
201 S Capitol Ave
Suite 200
Indianapolis, Indiana 46225
(317) 713-1700
(317) 713-1710 (fax)

Jeff Albee
GIS Department Manager
AMEC Earth and Environmental
3800 Ezell Road, Suite 100
Nashville, TN
USA 37211
(615) 333-0630
(615) 781-0655 (fax)