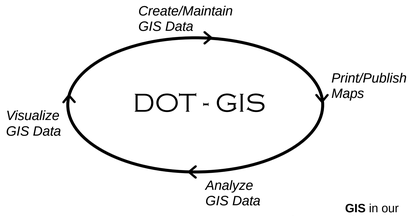
Using GIS for Traffic Operations Management

Introduction

The City of San Jose's Department of Transportation uses GIS (Geographic Information Systems) to maintain a spatial inventory of traffic management devices that are used to monitor system performance and provide information to support and improve the delivery of the department's services.

The key functions of GIS for Transportation Operations Management are to:

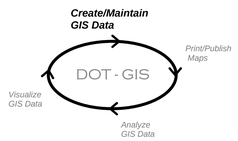
1 - Create and Maintain GIS Data
2 - Print and Publish Maps
3 - Analyze GIS Data
4 - Visualize GIS Data



This poster describes examples of how the department uses GIS in each functional area for the purposes of traffic operations management.

GIS in our department functions like a *loop*. For example, as data gets used; it gets reviewed and updated; and then used again. This illustration also reflects our conscious efforts to ***close the loop***.

Create and Maintain Data



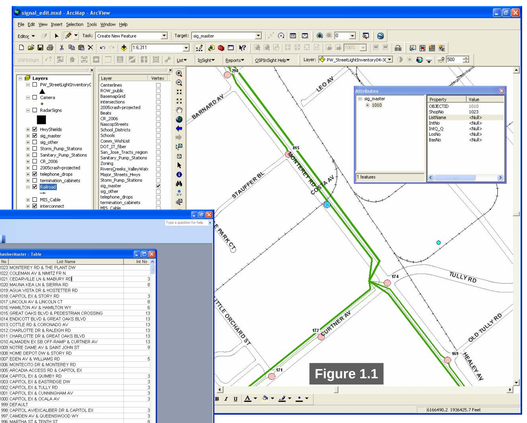


Figure 1.1

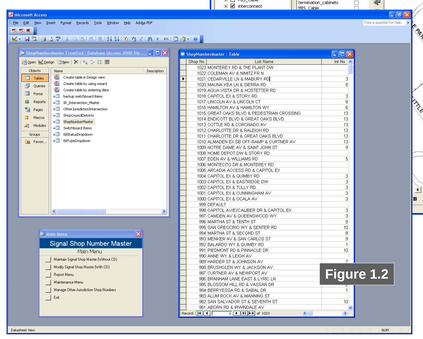


Figure 1.2

It starts with data.

The importance of creating and maintaining data, including its conscious design, cannot be underestimated. The department uses ArcGIS Desktop (ArcView and ArcEditor) software to create and maintain its GIS data.

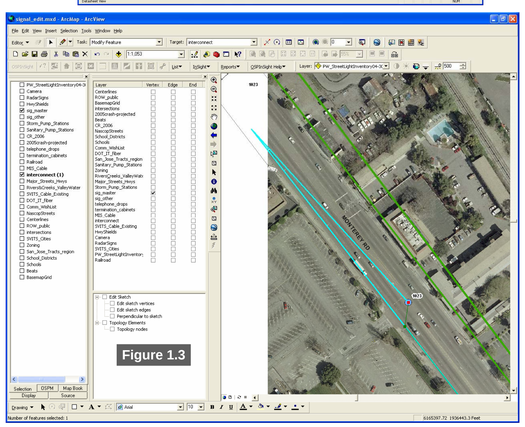
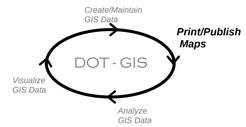


Figure 1.3

Figure 1.1 shows the creation of a signalized intersection node that is assigned a primary key-ID that will allow it to be "joined" to attributes from the database management application (shown in **figure 1.2**).

Figure 1.3 shows maintenance being performed on a cable features in the Traffic Signal Interconnect System GIS database. San Jose's DOT uses GIS to manage more than 150 miles of copper interconnect cable.

Print and Publish Maps



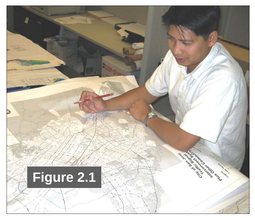


Figure 2.1

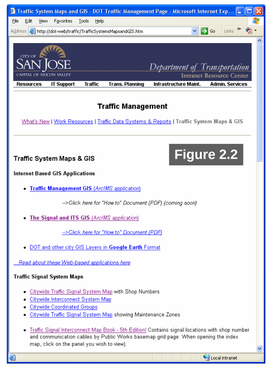


Figure 2.2

Figure 2.1 shows a colleague using the Traffic Signal System wall map available in the PDF format for planning future signal interconnection. This map is available through a departmental Intranet site (shown in **figure 2.2**).

Figure 2.3 shows another colleague using the interconnect map book. These maps are also posted to the Intranet site shown in figure 2.2.

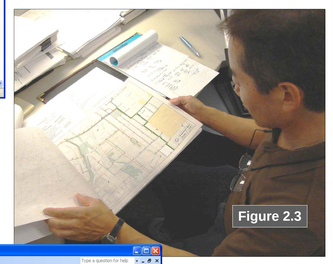


Figure 2.3

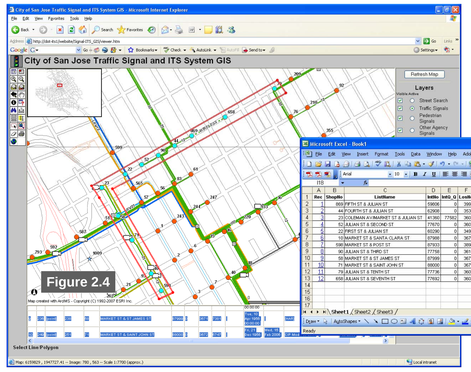


Figure 2.4

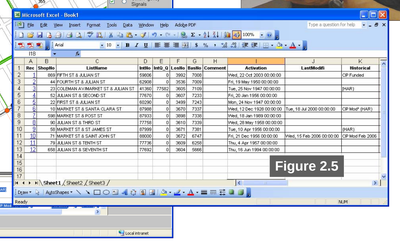


Figure 2.5

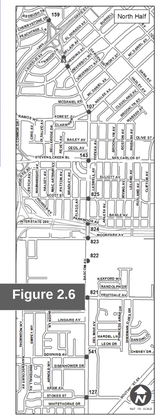
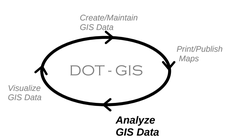


Figure 2.6

Figure 2.4 shows the ArcIMS (ESRI's Internet Map Server) application that allows GIS data and an application interface to be published through the department's Intranet. In **Figure 2.5** staff has copied and pasted the contents of a selection set into Excel for further review, greatly improving the process of list creation.

Figure 2.6 shows one of the many "plates" that have been made showing project extents for traffic signal project grant funding applications. The department has applied for and received more than $2,000,000 in signal related grant funding during the last 5 years!

Analyze GIS Data



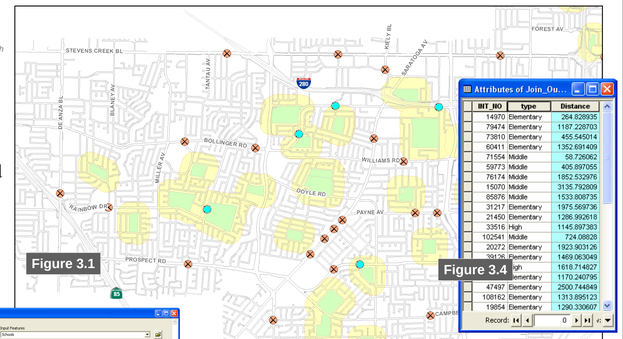


Figure 3.1

Figure 3.4

Figure 3.1 shows the map and selection set map of Warrant Study locations that meet the criteria of being within 600 feet (180 m) of a school.

The analysis dialogue is shown in **figures 3.2** and **3.3**. The results (shown in **figure 3.3**) can be exported to other applications.

Figure 3.4 shows that the actual distance to the nearest school can also be calculated. Improved modeling available in the GIS can be used to further automate the Warrant Study process.

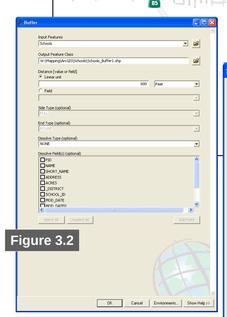


Figure 3.2

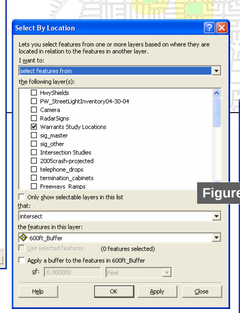
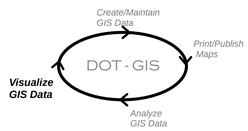


Figure 3.3

Visualize GIS Data



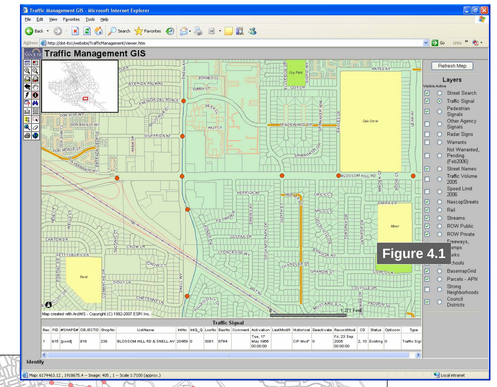


Figure 4.1

Figure 4.1 shows the ArcIMS application providing a basic view of the traffic management system to staff (here showing Administrative District boundaries, Traffic Signals, and NASCOP streets).

Figure 4.2 shows the process of exporting data to the Google Earth .kml format for GIS data visualization. This custom scripting Tool was provided by Kevin Martin of the City of Portland's Bureau of Planning.

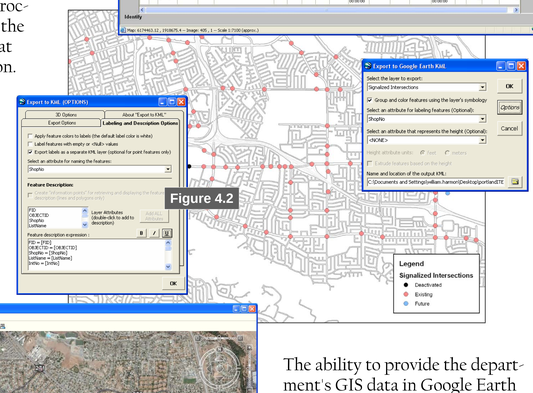


Figure 4.2

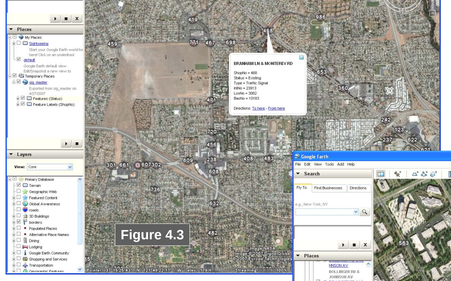


Figure 4.3

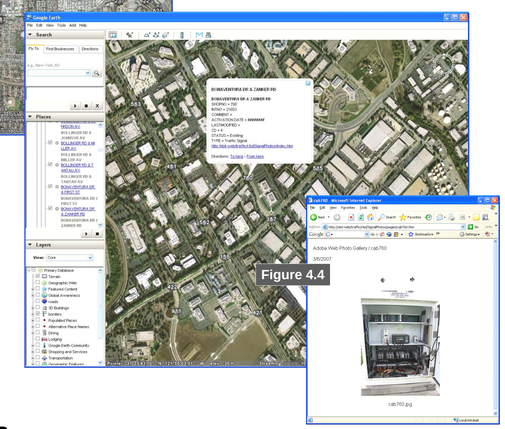


Figure 4.4

The ability to provide the department's GIS data in Google Earth maximizes staff accessibility to spatial information. **Figure 4.3** shows a user acquiring information about a Signalized Intersection through a more familiar interface.

Figure 4.4 shows Google Earth being extended to allow viewers access to site photography of traffic signal infrastructure (here showing the location's controller cabinet).

Closing the Loop

It ends with

...quality GIS data that is easily accessible to staff who use spatial information to complete day-to-day tasks. Improvements in data storage to centralized databases with more universal formatting will allow GIS data to appear seamlessly along all portions of the functional loop and on to the end-user.

Spatial data can also be expanded and integrated into other service management applications that the department maintains. As GIS continues to improve, so does the department's ability to use GIS tools that will continue to improve service delivery.

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Department of Transportation
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