

CLEVELAND'S GIS MAPPING IMPROVES RESPONSE TO UNPLANNED EVENTS

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Abstract:

In 2005, the City of Cleveland Division of Water began re-evaluating its work practices, looking for ways to improve response to unplanned events and overall efficiency. This initiative was named the DEEP Project (Developing Efficient and Effective Practices). The DEEP Project team identified a “quick win” by developing a new set of maps for field crews to use based off of the water department’s Hydraulic Model GIS which was completed in 2003. Crews were given laptops with electronic copies of maps as well as hard copy maps. With the flexibility of GIS, updates can be made quickly so that the crews have up-to-date information when responding to customer complaints. These new maps have saved time and frustration for crews responding to unplanned events.

Cleveland Division of Water DEEP Project Evaluates Work Practices

The Cleveland Division of Water has approximately 1,200 employees and serves over 1.5 million people in 76 communities. In 2005, the Division began re-evaluating its work practices, looking for ways to improve response to unplanned events and overall efficiency. This initiative was named the DEEP Project (Developing Efficient and Effective Practices). A committee of approximately 30 employees from all departments was established by the Commissioner of Water to conduct brainstorming sessions on how to improve work practices.

Evaluating the Response to a Report of a Water Main Leak

The first issue that the Commissioner asked the committee to investigate was the response to an unplanned event. A common unplanned event faced by the Division of Water is a water main break or water main leak.

The process typically begins with a customer reporting the leak, then a dispatcher describes the location to a field investigator who visits the site of the complaint to determine what action needs to be taken. Then a pipe repair crew arrives at the scene to make the repair (Figure 1 – at conclusion of text).

As the process was documented in the workshops, the DEEP Project team identified a “quick win” by developing a new set of maps for field investigators and repair crews to use based off of the Division of Water’s Hydraulic Model GIS which was completed in 2003. Existing street-level maps, known as roll maps, and area-wide maps, known as section sheets could be scanned and loaded onto laptops for use by the field crews. The Division of Water has over 10,000 roll maps and 120 section sheets. Better maps for the field crews meant easier communication of location information with the dispatchers, and improved response time for unplanned events.

Laptops loaded with these maps were rolled out to 6 crews in November 2005 as a pilot study. The results were impressive, so a second pilot study which will last 2-3 months, began in May 2006. The 6 crews who had laptops in the first pilot exchanged them for tablet pcs to experiment with different hardware and decide what would work best in the field. The original laptops were then given to 6 new crews so that a total of 12 crews were involved with the project. Based on the success so far, it is likely that 30-40 crews will receive mobile pcs with these maps by the end of 2007.

Map Lookup Application On Laptop Helps Pinpoint Locations For Field Crews

To make map lookup easier for the users, an application using Microsoft Access was developed to open the roll maps based on entry of a street name (Figure 2a, 2b). Section sheets could be opened by clicking on the appropriate sheet on a scan of the index map (Figure 3a, 3b).

For the crews to take advantage of the information from the GIS as soon as possible, data in ArcGIS was exported to PDF in a map book of 218 sheets. Since this map book was similar in design to the existing section sheets, these maps were called the Next Generation Section Sheets. These were also incorporated into the lookup application (Figure 4a, 4b). Hard copies of the Next Generation Section Sheets were printed as well for crews to have in the field for markups.

Next Generation Section Sheets

Being derived from GIS, the Next Generation Section Sheets provide several advantages over the old maps. The new maps are in color, and can be exported to PDF in vivid detail. With the flexibility of GIS, updates can be made quickly so that the crews have up-to-date information when responding to customer complaints.

Some examples of new information provided on the Next Generation Section Sheets are:

- Recently installed infrastructure that was mapped during the Hydraulic Modeling Project and not drawn on roll maps or section sheets
- Parcel Boundaries
- 50 Foot Contours

- Color-Coded Control Valves (a.k.a. Regulators) Based on Function
- Different Symbols for Valves on Transmission Mains vs. Distribution Mains
- Color-Coded System Valves Based on Function
- Color-Coded Water Mains Based on Function and Responsibility for Repairs (Local Community or Division of Water)
- Parcel-Level Pressure Zone Boundaries

The Citywide GIS Project and its Impact for Field Operations

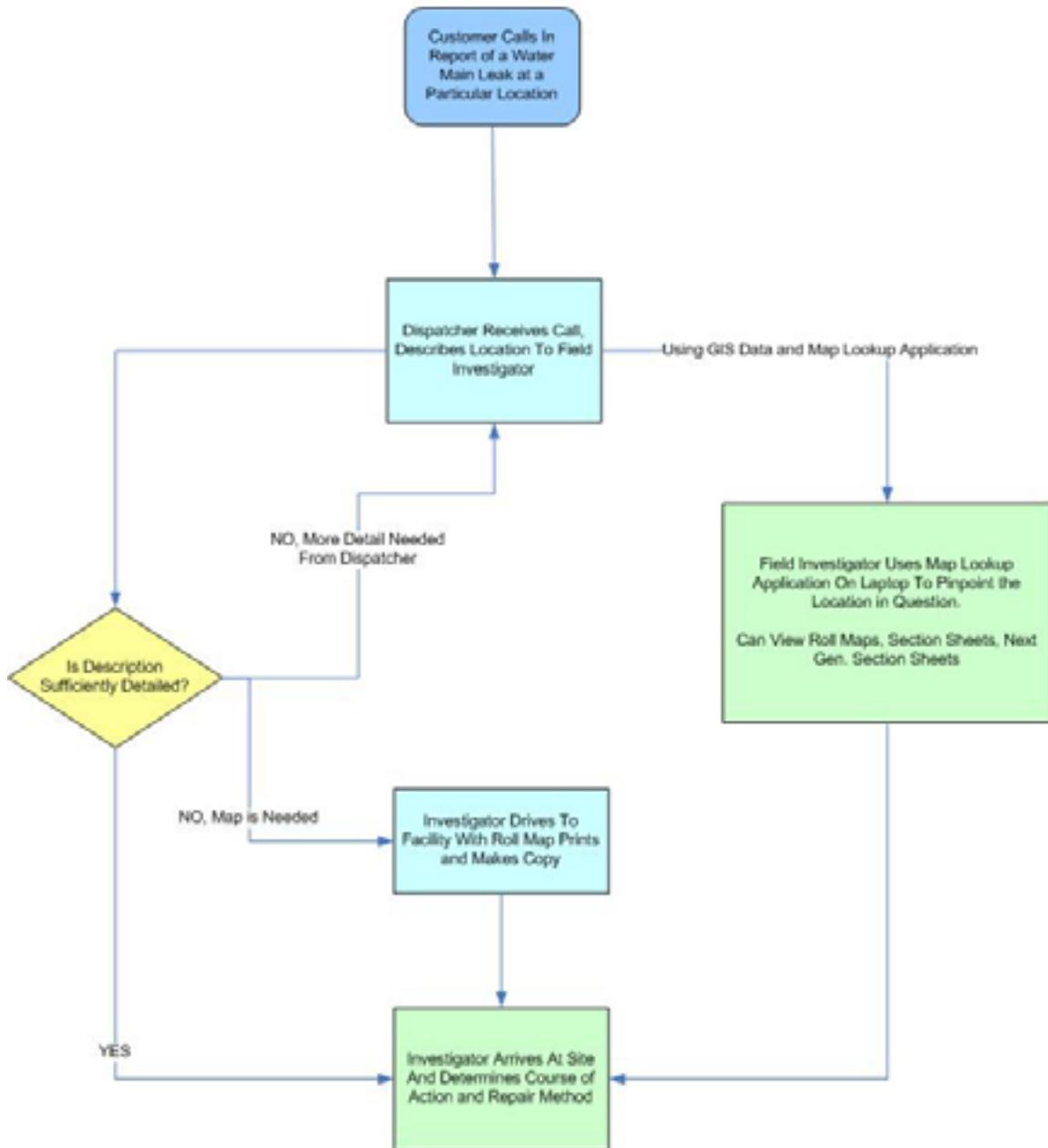
By December of 2006 the Citywide GIS project should be complete and every City Department will have access to centralized GIS data and applications. With the completion of this project field crews will be able to more efficiently access GIS data. Several mobile GIS applications are currently being evaluated to find the most effective and efficient way to distribute GIS data and functionality to field operation crews throughout the Cleveland Division of Water. One example of a potential application is to utilize ESRI's ArcReader software with published map files (PMF's).

Conclusion

In this case, a dataset developed primarily for Hydraulic Modeling in the Division of Water's Engineering Group has been used as a basis for a new map set that has saved time and frustration for crews responding to unplanned events. Building a straightforward, efficient lookup application and including scans of existing maps has also proven instrumental in the success of this program. As more crews receive GIS technology and the possibility of wireless network access, it will be easier for the crews to access up-to-date information.

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Figure 1. Basic Workflow Process From Report of a Water Main Leak to Determining Repair Method For Leak



Search for Rollmaps by:

Alphabetical Listing
 Numbered Streets West
 Numbered Streets East
 Rollmap Number

Type a full or partial street name To find Map, hit "Enter Key" or click on "Search" (Type in Rollmap Number)

Public Search

Rollmap List M: Main Listing | A: Auxiliary Listing | D: Old Street Name

RM NUM	Street	From Street	To Street	From Address	To Address	M/A/D
7026	ESSEX DR	BELMONT	DORSET DR	5590	5710	M
8294	ESTATES CT	PARKSIDE TR	OLL-DE-SAC			M
515	ESTERBROOK AVE	E. 88 ST	E. 90 ST			M
4905	ESTHER AVE	W. 227 ST	CLAGUE RD			M
4819	ESTHER RD	KENBRIDGE DR	RENEE RD			M
7064	ETHEL DR	LORRAINE	MARKS			M
8445	ETHEL DR	STRONGSVILLE		22432	22451	M
8549	ETHANS DR	OVIATT LN	DARROW RD			M
8653	ETON LN	EAST BRAINARD RD	FLORIDA AVE			M
7726	ETON ST	W. OF HARVARD	HADDEN	1928	2123	M
6278	ETTA BLVD	CHAS. DR	SLEEPY HOLLOW			M
48	EUCLID AVE	PUBLIC SQUARE	E. 22 ST	226	2124	M

To retrieve the image of a specific rollmap, hi-lite it in the list above, then either double-click on it or click on the "Get Image" button.

Figure 2a. Roll Map Lookup Application.

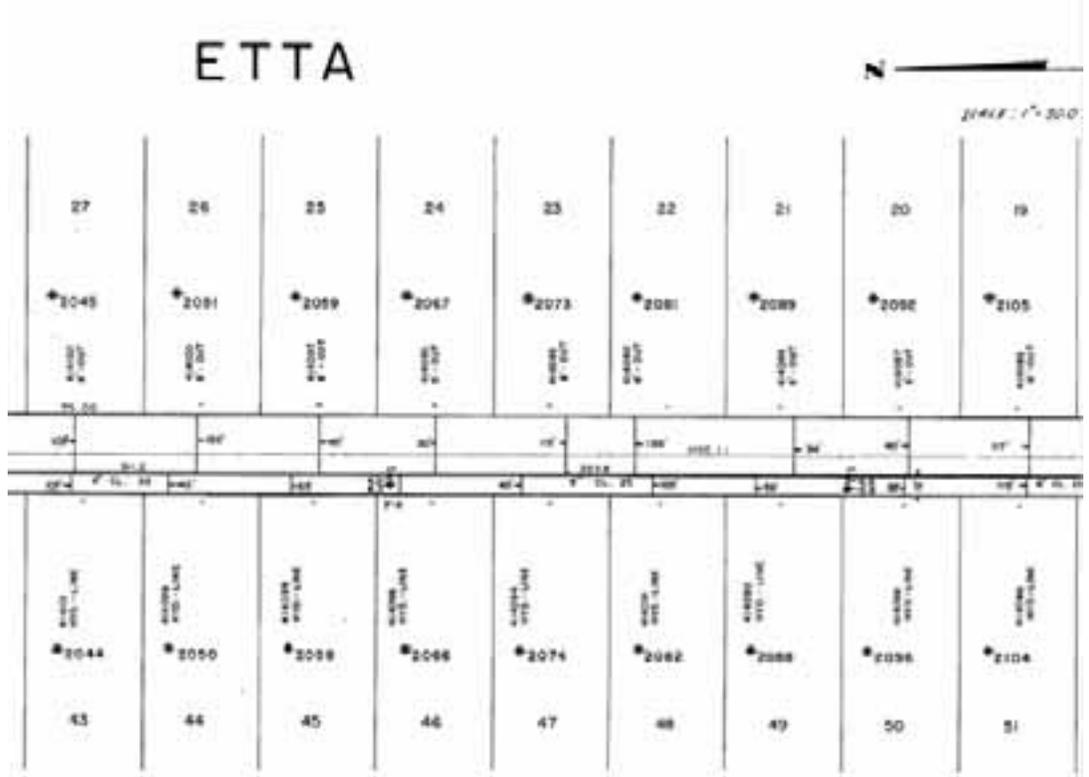


Figure 2b. Sample Roll Map Scanned Image.

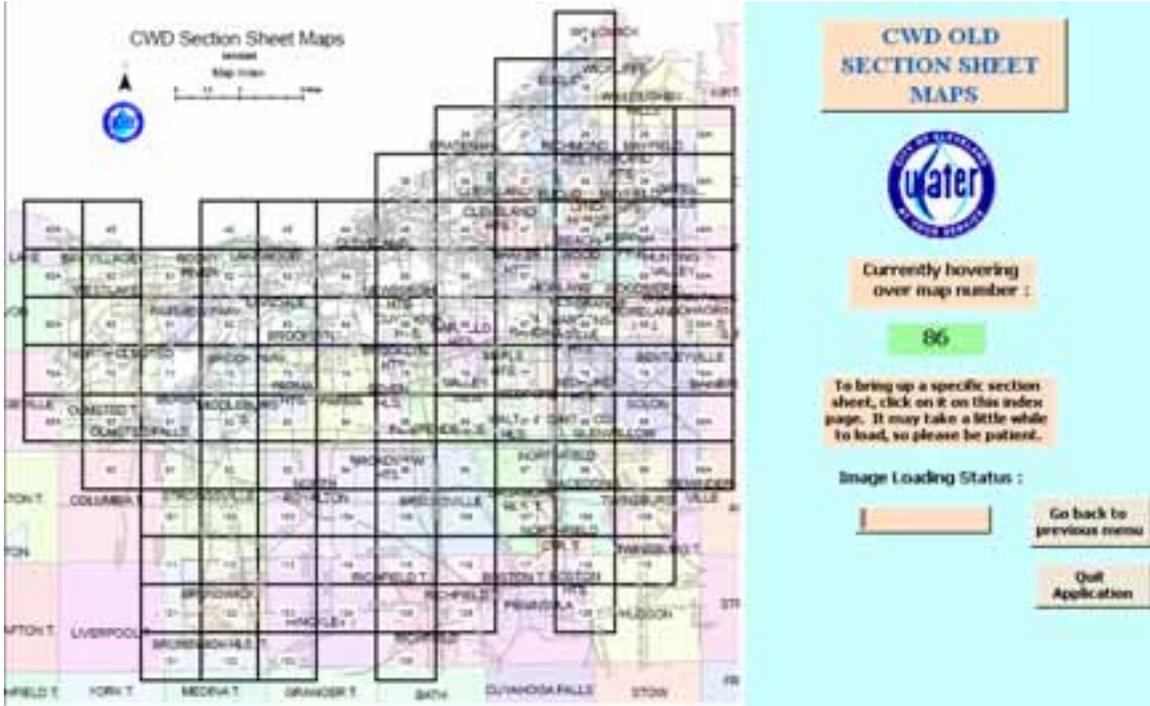


Figure 3a. Section Sheet Lookup Application.

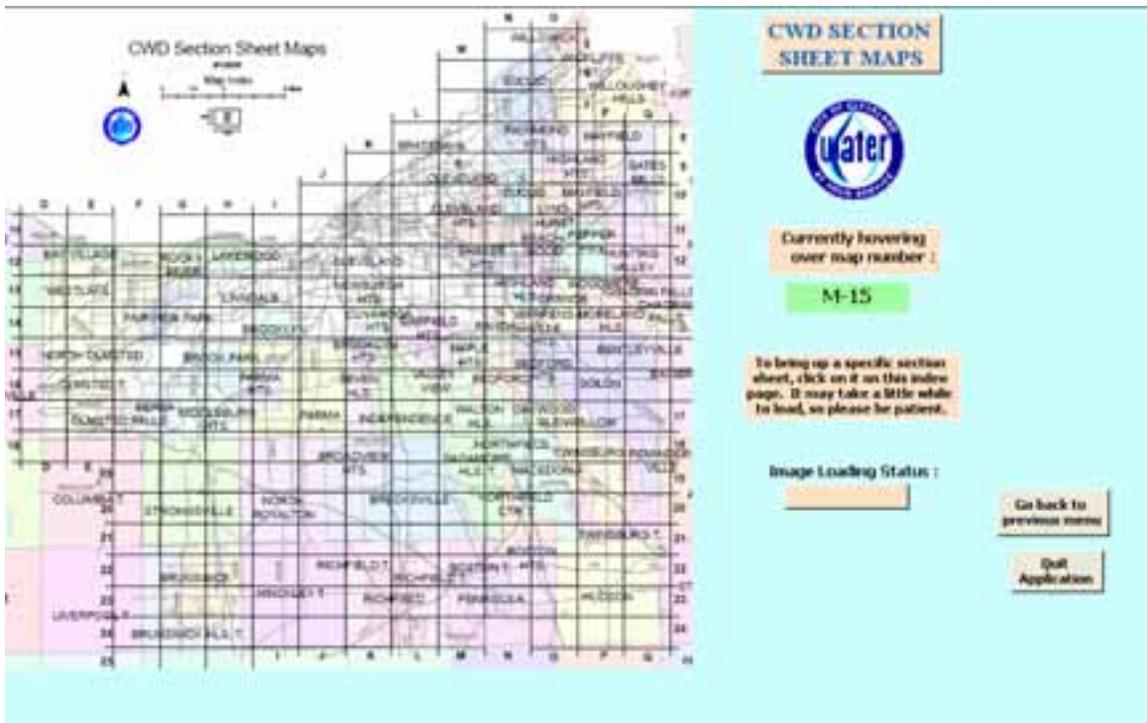


Figure 4a. Next Generation Section Sheet Lookup Application.

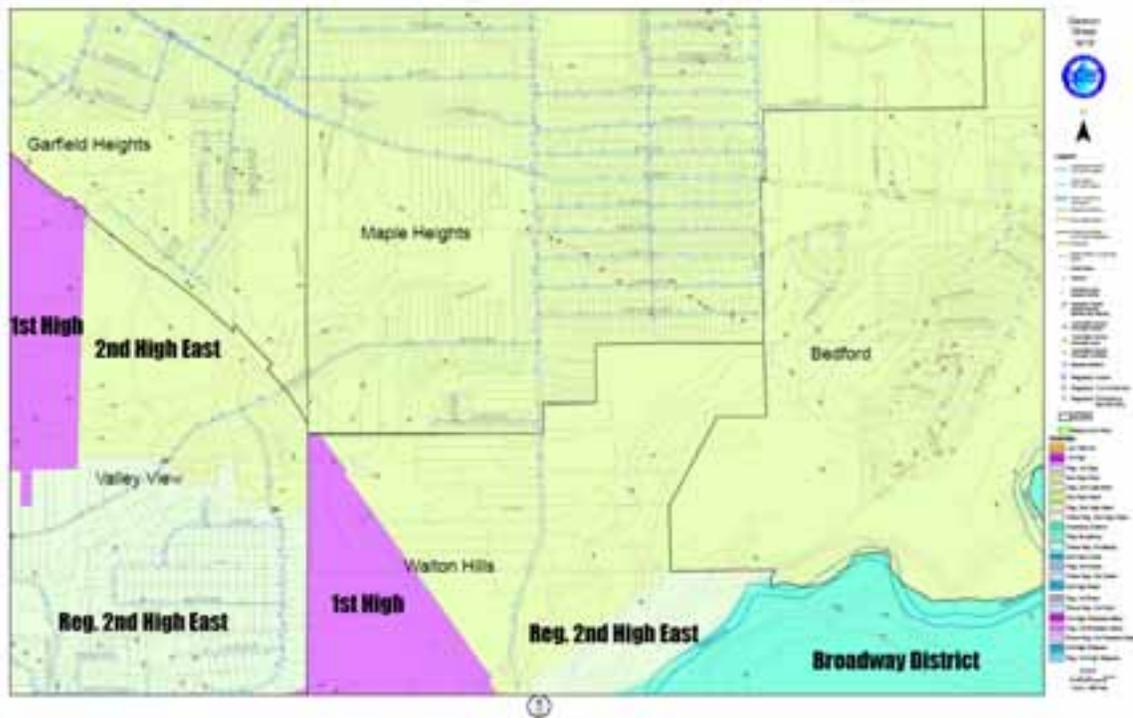


Figure 4b. Sample Next Generation Section Sheet.