URISA 2008 ESIG Award Application
City of Fontana
8353 Sierra Ave.
Fontana, CA 92335

A. SYSTEM

1. **Name of system and ESIG™ category for which you are applying (Enterprise System or Single Process System).**

   City of Fontana, Public Works GIS Viewer, ESIG Category Single Process System

2. **A letter from the executive administrator authorizing submission of the system application (letters must be signed and scanned).**

   Submitted as Appendix A in this Document

3. **One (1) page, or less, summary of what the system accomplishes and why it is exemplary.**

   Submitted as Appendix B in this Document

4. **Three "user testimonials". These testimonials should include the title of the system, the person's name, job title (if relevant), a statement of what specific ways the system improves their work and/or the work of their organization, and how frequently they use the system (testimonials may be signed and scanned).**

   Submitted as Appendix C in this Document.

B. JURISDICTION

1. **Name of jurisdiction**

   City of Fontana, California

2. **Population served by the organization/agency**

   January 2007, State Department of Finance population estimated 181,640. The City has experienced significant residential and commercial growth of 40 % since 2000. Recent annexations have increased the city population to 184,682.

3. **Annual total budget for jurisdiction**

   The General Fund Budget for Fiscal Year 2008 is $70,318,000.

4. **Name, title, and address of chief elected and/or appointed official:**

   Kenneth R. Hunt
   City Manager
   8353 Sierra Ave.
   Fontana, CA 92335

5. **Contact person for system**

   Rogelio Mata, Senior Administrative Analyst,
   16489 Orange Way, Fontana, CA 92335,
   Tel (909) 350-6660, Fax (909) 350-6755, rmatta@fontana.org

C. SYSTEM DESIGN

1. What motivated the system development?

The motivation for developing the system was a variety of factors including rapid land development, increases in infrastructure regulatory requirements, fiscal pressures to improve efficiency, desire for improved customer service, and the overall need to improve effectiveness of operations.

- Significant population growth increasing demand on services.
- City desire to provide high quality customer service.
- Expanded infrastructure increasing the need for additional maintenance.
- Aging infrastructure is generating additional workload for maintenance, repair, and replacement.
- Federal EPA regulations require implementation of additional management practices to confirm the wastewater infrastructure has the capacity to serve the growing population.
- Management of existing plans, maintenance records, and service requests were paper based which made it difficult and time consuming to access the information.
- Existing work management processes are not scaleable to address increasing work demands efficiently.
- Many of the infrastructure management workers have a detailed understanding of the system characteristics, yet much of this knowledge is not captured within an information system. When they retire, their unique knowledge will be lost.
- Financial pressures require increasing efficiency and effectiveness.
- The City had begun development of an enterprise GIS program including basemap GIS data development.
- Maturing of information technologies present an opportunity to develop an integrated work management system to address the project drivers.

2. What specific service or services was the system intended to improve?

The City of Fontana GIS Public Works Viewer was designed and developed to improve the effectiveness of our workforce for planning, operations, and maintenance of the city's public works infrastructure. The system improves the efficiency and effectiveness of staff in the office and the field by providing direct access to information in a task relevant format.

Specific service improvements targeted by the system include the following.

- *Improve information access to field workers* to facilitate the performance of sewer system maintenance and repair activities. This is accomplished by providing mobile and office access to the sewer GIS, as-built drawings, the work management system (work orders and service requests), property and ownership information, and aerial photos.
- *Reduce field staff "downtime"* due to the need to travel from the worksite to the office to research and review infrastructure documents.
- *Increase worker self reliance for information gathering*. Prior to system deployment, office staff were essential for communicating information via mobile radio, typing and filing paper based work order documents, and supporting call dispatching. Use of digital online data and forms provides a means for field workers to perform research and documentation.

- *Improve customer service* with increased service request responsiveness and the ability to provide timely information about active and pending work orders. Additionally, urgent service requests can be better addressed by dispatching available field workers based on proximity to the service request location.
- *Comply with regulatory requirements.* Increasingly, the City is required to comply with a variety of regulatory requirements associated with asset management, waste water system operations, and reporting requirements. Compliance based on the old paper based processes and information has been time consuming and difficult.
- *Improve Capital Improvement Planning* by improving the information quality about asset condition, impacts of growth on the infrastructure, evaluation of work history by asset, and visualizing the information using maps. The integrated system provides automated methods for tabulating, evaluation, and modeling alternate project scenarios that assist in annual work plan prioritization and budgeting.
- *Institutionalize information and knowledge.* The system and associated work processes are intended to be the authoritative information repository that improves with use over time. This key strategy is intended to maximize flexibility for deploying staff and provide new staff with authoritative data to support their work assignments. Historically, individual personnel often were the experts based on their long tenure with the city, when they retired, the knowledge was lost.

3. What, if any, unexpected benefits did you achieve?

Although we envisioned and target broad improvements in our operations, we experienced several unanticipated benefits resulting from deployment of the system

- *Increased workforce commitment and information ownership.* By providing staff direct access to information in the office and field, they took an increased ownership perspective over the data to insure it is current and correct. Detected errors are reported and updated, where in the past; this was a difficult process that was often not accomplished.

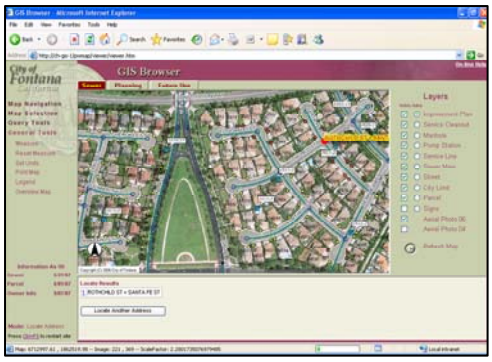


Figure 1: Application screen showing locating by cross street.

- *Citywide interest and appreciation for GIS.* The Public Works GIS Viewer has been acknowledged as a successful system that delivers improved infrastructure management and operational capabilities. Other departments are using the GIS data to improve their activities and are seeking further integration of their data with online GIS systems. This broader support for GIS is expected to enhance program sustainability and improve return on investment further through economies of scale and re-use of information and systems.

4. What system design problems were encountered?

The City approached the implementation of the system in incremental steps which allowed sufficient resources to address design and deployment elements thoroughly before progressing to the next stage. Design challenges include the following:

- *Inconsistent spatial representation.* The GIS parcel and street basemap alignment errors became evident with the acquisition of high resolution orthophotos. At that point, the mapping accuracy standards for the City GIS were upgraded and unanticipated effort was required to enhance and correct the spatial accuracy of

parcels, centerlines, utilities, and all other layers. This work also provided an opportunity to increase the consistency of the GIS so that it was a reliable source for GIS analysis.

- *Need to redefine data maintenance workflow.* At each phase of the system development, business processes were reviewed and analyzed. With the shared system using digital forms and maps, it became evident that new workflows were needed to leverage the new efficiencies of online data access and processing. A key example is the reduction in document handling and resulting process streamlining for work order scheduling and tracking.
- *Managing consistent asset IDs*. Integration of databases requires common asset identifiers or other spatial indexes to correlate work management records with the GIS. We had to develop a common referencing system between the GIS and work management system to enable complete and precise linkage of all data records between systems. Moreover, we created a standard process for assigning IDs within the GIS when assets were initially mapped.
- *Designing to accommodate GIS software changes*. Software in general and particularly GIS, continues to change rapidly. Keeping current software versions and leveraging new features for enhanced capability and effectiveness became a challenge. The expectation for using the first rendition of applications faded with continued technology advancements and broadening expectations for added features. Today it is accepted that annual system enhancements are needed to keep pace with underlying software changes and user expectations.

5. What differentiates this system from other similar systems?

The System represents a combination of various systems configured and integrated to provide access to information in a manner that addresses specific information needs of various city business functions. As such, the system is differentiated from commercial off the shelf products; however, the City configuration may represent needs of other governmental agencies with similar needs.

- *Full integration of all needed information*. The system provides direct real time access to multiple data stores and presents the information through a common interface. GIS provides detailed inventory and characteristics of the sewer system, addresses, parcels, and owners; GBA Master provides work management and service request data linked directly to assets and addresses; LaserFiche provides access to as-built drawings that are indexed to location for easy access; and the GIS viewer presents and integrated presentation of all data.
- *Work management is directly integrated with GIS.* Direct integration of GBA Master work management system with GIS provides full information consistency and reduces data maintenance with a single point of update. Cost and work effort data is easily attributed to assets for future work forecasting and capital improvement planning.
- *Direct access by office and field staff.* Staff has full time access to the system whether they are in the office or the field. This high availability to comprehensive project data develops reliance on the system, not unlike the trend with Blackberry PDA's popularity. The system reliance creates a positive reinforcement for correcting information defects that may be in the system.

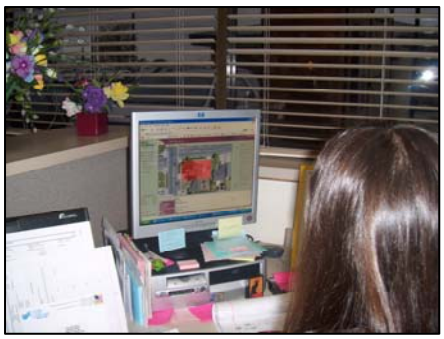


Figure 2: Application use in the office links all documents and records.

- *Incremental deployment strategy.* The system began with the concept for overall integration of the various systems, but progressed in incremental steps that were appropriate for the City. Incremental successes resulted which increased assurance of the system viability and demonstrated a positive return on investment. These progress milestones resulted in managerial support and funding for future phases as well as acceptance by line staff who are the direct system stakeholders.

D. IMPLEMENTATION

1. What phases did you go through in developing the system?

Implementing the Citywide Asset Management Program using GIS is a significant undertaking, requiring organization and automation of all historical data, adoption of new data standards, reworking procedures, integrating existing information systems, and changing the way our staff work. Recognizing this, Fontana proceeded with the following incremental processes over the course of several years.

- *Scanned all engineering drawings and wastewater field notes and brought them online using LaserFiche enterprise document management system.*
- *Developed a citywide GIS database including aerial photos, parcels, streets, and the wastewater infrastructure digitized from the scanned drawings. Fontana coordinated closely with San Bernardino County to obtain and update parcel data and maps.*
- *Implemented a web GIS Map Browser providing all city staff access to the GIS data, maps and drawings.*
- *Deployed GBA Master Series Asset Management software linking all work activities to specific assets.*
- *Extended GIS Map Browser access to field workers using ruggedized computers so each vehicle could access all drawings, GIS maps, and work orders.*
- *Expanded GIS Map Browser to include planning, environmental and other data supporting other city department information needs.*

2. Were there any modifications to the original system design? Why? What?

As stated previously, the system developed incrementally allowing for progressive definition of features and the design itself. In fact, the conceptual system design was not fully envisioning the system as it is deployed today.

Incremental implementation allowed us to take advantage of emerging technologies. For example, the mobile GIS communications strategy began with disconnected data access, then envisioned using a nascent city wifi network, and finally adopted an air card approach for reliable connectivity of mobile PCs.

With the success of the sewer system browser, other departments are now piggybacking on the system to incorporate other GIS data layers at a small marginal cost. As this development progresses, the entire city operations will be enhanced and better coordinated to fulfill our service to the public.

E. Organizational Impact

1. What user community does the system serve and how?

- *Field Operations and Maintenance* – The field personnel have direct access to the work order system, GIS, and as-built drawings to support their daily activities. Work orders scheduled in the office are reviewed by staff and executed in the field. Activity

records are filled out using the mobile PCs. During field activities, research is performed using GIS and the document repository.

- *Office Support Staff* – Several office staff provide a point of contact for the public for service requests. The calls for service are logged directly into the GBF Master Series system and made accessible to work schedulers and field personnel. Office staff also provides information research for field workers, although this work has diminished significantly with the deployment of the mobile systems.
- *Business Analysts*. Budget planning and capital implement project planning and management require access to the GIS for future project plans and the work management system to establish maintenance statistics, develop trends, and produce report of miles of pipe.
- *Other departments.* Staff from other departments are using the GIS sewer browser to look up property information, print project maps, and view the aerial imagery.

2. What are the ultimate decisions/operations/services being affected? If appropriate, provide a few examples including, but not limited to: screen input/output forms, paper products, or other descriptive graphics.

The Public Works Department had no software system to track work history on city owned assets. Faced with the need to efficiently track and report on maintenance history and regulations such as GASB 34 requiring the city to identify and track major assets, a decision was made to move from a paper driven environment to a paperless/wireless computerized GIS based work management system.

Since many of the activities that the department was responsible for i.e. street maintenance, sewer maintenance, storm drain maintenance, environmental services, park maintenance etc. were all asset or land based, a software system that was integrated with GIS would yield the greatest benefit to the department and the city. The second consideration was the need to access construction drawings in the field as well as on the desktop. Thirdly, the department desired to identify its major assets such as sewers and streets using a software system that was fully integrated with GIS while having the capability of creating work orders linked to the asset and being able to track work history by each asset rather than just by location.

For ease of information distribution an ARCIMS solution (which is currently being converted to an arc server solution) was created to allow for wider use by staff. This simple interface developed by Psomas offers asset/parcel information as well as access to construction drawings. This interface was created with the emphasis on distributing information to users that were not necessarily interested in the work history aspects of the system.

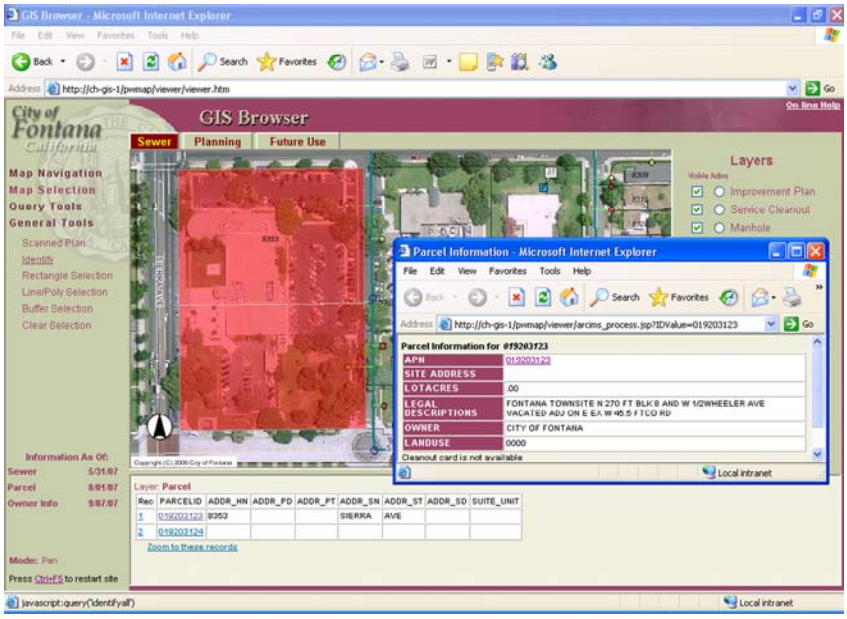


Figure 3: Property information accessed through GIS.

3. What were the quantitative and qualitative impacts of the system?

- $30,000 annually recurring staff savings due to efficiency improvements.
- Reduced vehicle mileage and associated staff time by providing mobile computer access to the system.
- Improved asset inventory, condition knowledge, and maintenance history allows optimization of operations and maintenance activities to extend asset useful life and assuring the right level of maintenance is provided.
- More responsive customer service with ability to dispatch based on proximity of field workforce to the service call.
- Geoauditing identified a significant number of sewer connections previously missed in the billing system, thus increasing city revenue for connection fees.
- GIS visualization helps identify assets missed during maintenance programs and enabling subsequent maintenance scheduling to ensure compliance.

4. What effect has the system had on productivity?

- Workforce productivity has increased for both the field and office staff. Direct access to information has reduced research time by more than 50%. A time and motion study determined a reduction of 50% for document research, retrieval, and refilling once the as-built drawings were scanned and linked to the GIS. This is significant since seven (7) person years were previously spent among multiple departments accessing plans.
- Field workers spend less time locating assets that may be obscured by vegetation.
- Empowered the workforce by providing direct access to information improved efficiency and increased moral.

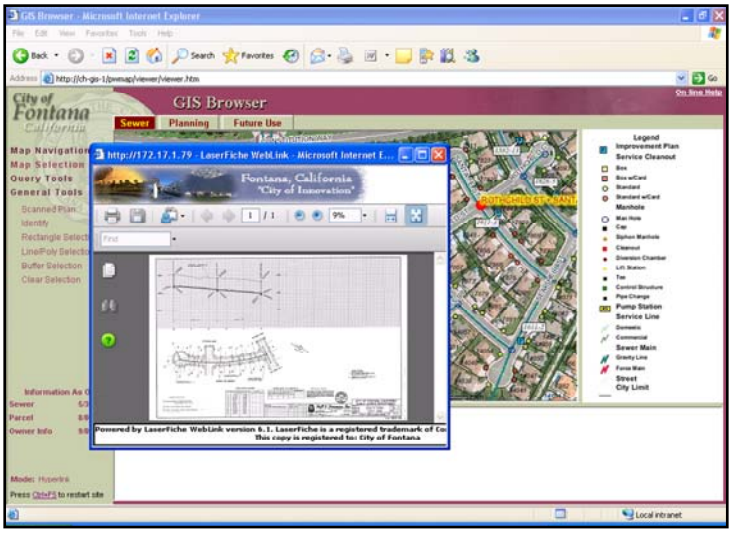


Figure 4: As-built drawings are accessible by clicking an asset on the map.

5. What, if any, other impacts has the system had?

- Institutionalizing of information and knowledge through the information system reduces the impact of retiring veteran workers who had been the data repository.
- Reduced risk of catastrophic loss of documents by scanning and archiving offsite.
- Other City departments are benefiting in similar ways with improved information access to property and asset information.

6. How did the system change the way business is conducted with and/or service delivered to clients? Give specific examples comparing the old way with the new.

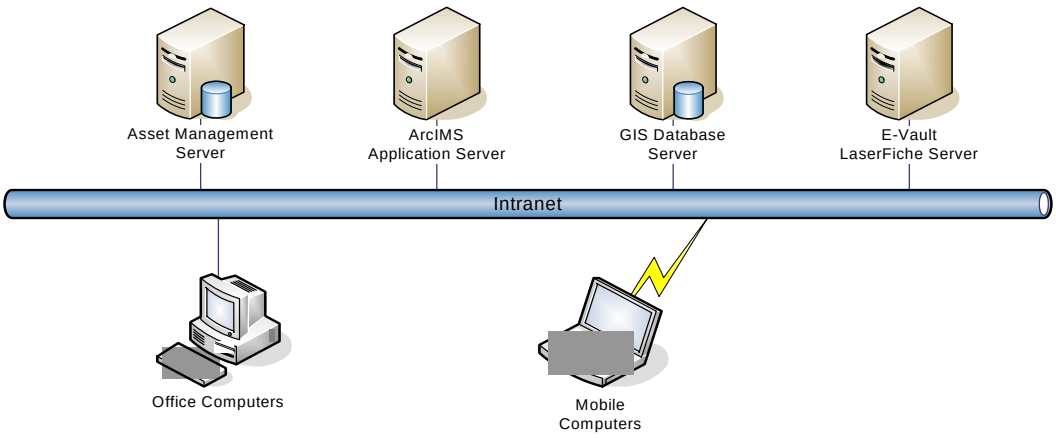
- Field workers often had to radio to the office and get another person to access information to assist them. Often a trip to the office to obtain documents was required to complete a work order. With the system in place, the field workers have direct access to the information making it immediately available when needed. Trips are now unnecessary for infrequent and field and office productivity has increased as a result.
- Field workers responding to urgent service requests would be dispatched and might have to travel across town to respond contributing to traffic congestion and air quality concerns. Now the dispatcher has the ability to locate the nearest available and suitable resource to dispatch to a service request. The system now reduces travel miles and call response time.
- Customer service calls require confirmation that the location is within the city limits, this process was time consuming and error prone with manual records. With the GIS, the address is keyed into the system and the result of the query identifies if the address is within the city limits. The determination is nearly instantaneous, enabling a call taker to respond to the public immediately, thus reducing call backs and enhancing customer service.

F. System Resources

1. What are the system's primary hardware components? Give a brief list or description of the hardware configuration supporting the system.

The system integrates several systems that are operating on different servers within the city's IT infrastructure.

City of Fontana
Hardware Environment



- *Asset Management Server* – Hosts the asset management database and GBA Master asset management application.
- ArcIMS Application Server – Web based GIS viewer application server linked drawing upon data from the asset management system, GIS databases, and LaserFiche documents.
- GIS Database Server – An ESRI ArcSDE server hosting all city GIS data including the sewer system geodatabase, parcels, property ownership data, and aerial photos.
- LaserFiche Server – Document management server containing the LaserFiche application and all documents including engineering drawings and scanned field notes linked to GIS locations.

- Office Computers – Multipurpose desktop computers used to access the any of the applications through the city intranet.

  Mobile Computers – Ruggedized laptop computers mounted in service vehicles provide wireless access to the applications running on the city Intranet.

2. What are the system's primary software components? Describe the primary software and, if a commercial package, any customizations required for the system.

The software that comprise the integrated GIS environment are commercial off the shelf software configured to address specific needs of the city as stand alone and integrated software components.

- *ESRI ArcGIS* – COTS GIS software used for data maintenance, advanced data analysis, and high quality mapping.
- *ESRI ArcIMS* – Web based GIS used as the primary mapping interface for the sewer browser. The application is a custom application built on the ESRI ArcIMS technology platform.
- *ESRI ArcSDE* – The GIS repository is managed using ArcSDE in an SQL Server environment. ArcSDE is effective in managing access control, indexing and retrieving aerial imagery in addition to many citywide GIS data layers.

Figure 5: Mobile application provides field personnel access to GIS, assets, work orders, and documents.

- *GBA Master Series* – A full featured asset management and work management software package that directly integrates with the ESRI GIS database and ArcGIS applications.
- *LaserFiche document imaging and management system*. Provides for storage, search, and retrieval of scanned and other digital documents.

3. What data does the system work with? List and briefly describe the database(s).

GIS Data Layers

- *Parcels* – Assessor parcel polygons with associated property ownership and characteristics data.
- *Addresses* – Individual addresses associated with Parcels. Multiple addresses per parcel, utility addresses, and other address types are supported.
- *Streets* – Street centerlines and street names.
- *Sewer Assets* – GIS layers represent the sewer pipe, manholes, and cleanout locations. Each asset is described with data characteristics including material, diameter, length, invert elevations and other attributes.
- *Aerial Photos* – 3 in full color orthophotos with +- 2 foot horizontal accuracy.

Other Data

- *GBA Data* – Includes work history, scheduled maintenance activities, past maintenance history, active and closed service requests, costs and resources, inventory, and other information supporting ongoing system operations and maintenances.
- *Images* – As-built drawings and scanned clean out cards cataloged and indexed within the LaserFiche DMS. Documents are indexed within the GIS to simplify document retrieval by location.

4. What staff resources were required to implement the system (i.e., report approximate staff and consultant time as FTE's)

Implementation of the system required data updating, conversion, and implementation of the software system. These activities occurred over several years and in some cases, the activities (such as data organization) were part of standard staff job duties. Other activities were specific system design and implementation efforts which required new work efforts by the City and consultants.

The project team overseeing implementation included representatives from Public Works Administration, Public Works Field Operations, and Information Services. The implementation was performed over a two year period with several phases of work that included GIS data conversion, GIS Viewer Development, GBA Master Implementation, and Mobile application deployment.

FTE	Position	Organization
.15	Senior Administrative Analyst	City of Fontana
.30	GIS Application Programmer	City of Fontana
.10	Maintenance Service Worker	City of Fontana
.10	Administrative Secretary	City of Fontana
.15	Project Manager	Consultant
.30	GIS Application Programmer	Consultant
1.5	GIS Technicians	Consultant
.30	GIS Analyst	Consultant

Appendix A
Letter from Executive Administrator

City of Fontana
Public Works Department
16489 Orange Way
Fontana, CA 92335
(909)350-6760

June 2, 2008

URISA ESIG Award Committee
1460 Renaissance, Drive Suite 305
Park Ridge Illinois 60068

Dear 2007 ESIG Selection Committee:

I am authorizing the following admission for consideration in the Single Process System Category for the 2008 URISA Exemplary Systems in Government Award for the: ***City of Fontana, GIS Browser& Work Management System.***

Thank you for the opportunity to submit this application for consideration. If you have any questions please contact Rogelio Matta, Senior Administrative Analyst for the Public Works Department at (909) 350-6660 or rmatta@fontana.org.

Sincerely,

Kenneth R. Hunt
City Manager

Appendix B
Summary of Public Works GIS Viewer System
City of Fontana, CA

The Public Works Department had no software system to track work history on city owned assets. Faced with the need to efficiently track and report on maintenance history and regulations such as GASB 34 requiring the city to identify and track major assets, a decision was made to move from a paper driven environment to a paperless/wireless computerized GIS based work management system.

Since many of the activities that the department was responsible for i.e. street maintenance, sewer maintenance, storm drain maintenance, environmental services, park maintenance etc. were all asset or land based, a software system that was integrated with GIS would yield the greatest benefit to the department and the city. The second consideration was the need to access construction drawings in the field as well as on the desktop. Thirdly, the department desired to identify its major assets such as sewers and streets using a software system that was fully integrated with GIS while having the capability of creating work orders linked to the asset and being able to track work history by each asset rather than just by location.

An assessment of all department workflows at the activity level was completed that identified the needs in these areas. While each activity had differences, each had enough similarities to find an integrated software solution. The department chose GBA Master Series Software.

All areas start with an asset network that they will be "attached" to; a parcel, an address, a sewer segment, a street segment, a facility, etc. Each asset has record drawings associated with them, i.e. sewer construction drawings, park construction drawings city owned building floor plans. Once the asset is available in the system work orders and inspection records can linked the individual asset, making tracking of maintenance a simple process. Since this system is integrated these records can be accessed through the work order software module, the inventory record module or the GIS map in the field by way of wireless laptops or at desktop depending on the activity.

For ease of information distribution an ARCIMS solution (which is currently being converted to a arc server solution) was created to allow for wider use by staff. This simple interface developed by Psomas offers asset/parcel information as well as access to construction drawings. This interface was created with the emphasis on distributing information to users that were not necessarily interested in the work history aspects of the system.

The result is a tightly integrated system that offers a wide variety of users from field staff to office staff tools necessary to cover a wide range of needs in one package. This system has gain a high level of acceptance by city staff and has become the information portal of choice for staff in many disciplines across all city departments. We believe that this system is exemplary due to its wide acceptance as well as its utility and usefulness.

Appendix C
User Testimonials

City of Fontana
Public Works Department
GIS Browser/Work Management System - Testimonials

I use the system on a day-to-day basis. Currently one of my duties includes completing a stop sign retro-reflectometer condition assessment. Being able to access inventory data in the field in a GIS environment is critical to the success of the assessment. I can identify individual stop signs on a map in my vehicle and create or update inventory and inspection records on- the-fly in the field. This s a very useful tool that helps me be productive and efficient.

Mike Burgstaler
Maintenance Services Worker II
Public Works Department
City of Fontana

As the Senior Administrative Analyst for the Public Works Department, one of my roles is to do research and provide information to department staff. Having the capability of moving seamlessly from work history to asset inventory to GIS analysis of the same data helps me respond effectively to request for information. Being able to easily provide GIS based reporting to the individuals in the department on demand has been a huge benefit.

Rogelio Matta
Senior Administrative Analyst
Public Works Department
City of Fontana

I am responsible for responding to Underground Service Alert requests, which basically means that mark the streets indicating where the sewer lines are buried. Having the capability of the seeing the sewer line in a GIS map on my computer is critical to being able to get my job done effectively. Using this system I am able to pull up construction record drawings for the entire sewer system on my computer instead of having to go find paper maps, which make my job much easier.

Mark Deleon
Maintenance Service Worker II
Public Works Department
City of Fontana