The Evolution of an Enterprise GIS

at

Bonita Springs Utilities, Inc.

May 3, 2007

Franchise Area

- In Lee County, situated between Naples and Fort Myers including the City of Bonita Springs and South Estero, from the Collier/Lee County Line north to Williams Road

Bonita Springs Utilities, Inc.
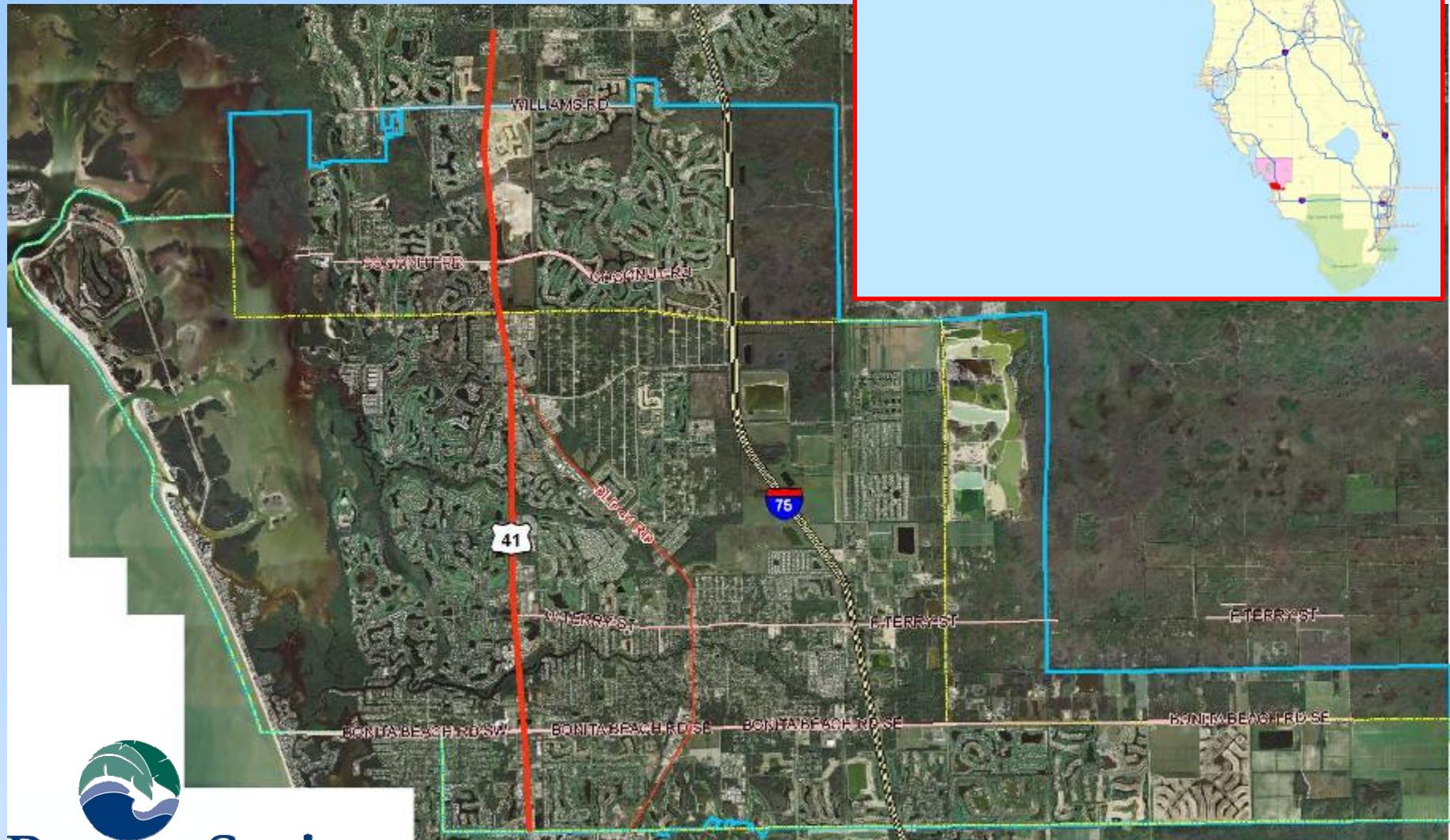
Bonita Springs Utilities, Inc.

History of GIS at BSU

- 1998-2001 started with ESRI.
- 2001-2003 switched to AutoCAD and MapGuide based Kanotech Information Systems' CivicCenter.
- Up until the end of 2003, BSU did not have an internal GIS department; all work was performed by outside consultants.
- I was hired at the end of 2003 and throughout 2004 I looked to move back to ESRI.
- Switch back to ESRI was eventually done in January 2005 at version 9.0 with the assistance of Michele Lundeen (ESRI West Palm Beach) and Mark Nelson/Dave Jenkins (Jones Edmunds and Associates-Gainesville).

Bonita Springs Utilities, Inc.

Conversion

- The conversion back to ESRI from Autodesk was performed from January '05 to March '05 by JEA.
  - Linked meters to Customer Service database and placed by relation to Parcel Strap #.
  - Built customized application to load new meters as well as to load submitted GIS data created in the previous Kanotech software package.

Bonita Springs Utilities, Inc.

CAD/Meter Loader Application
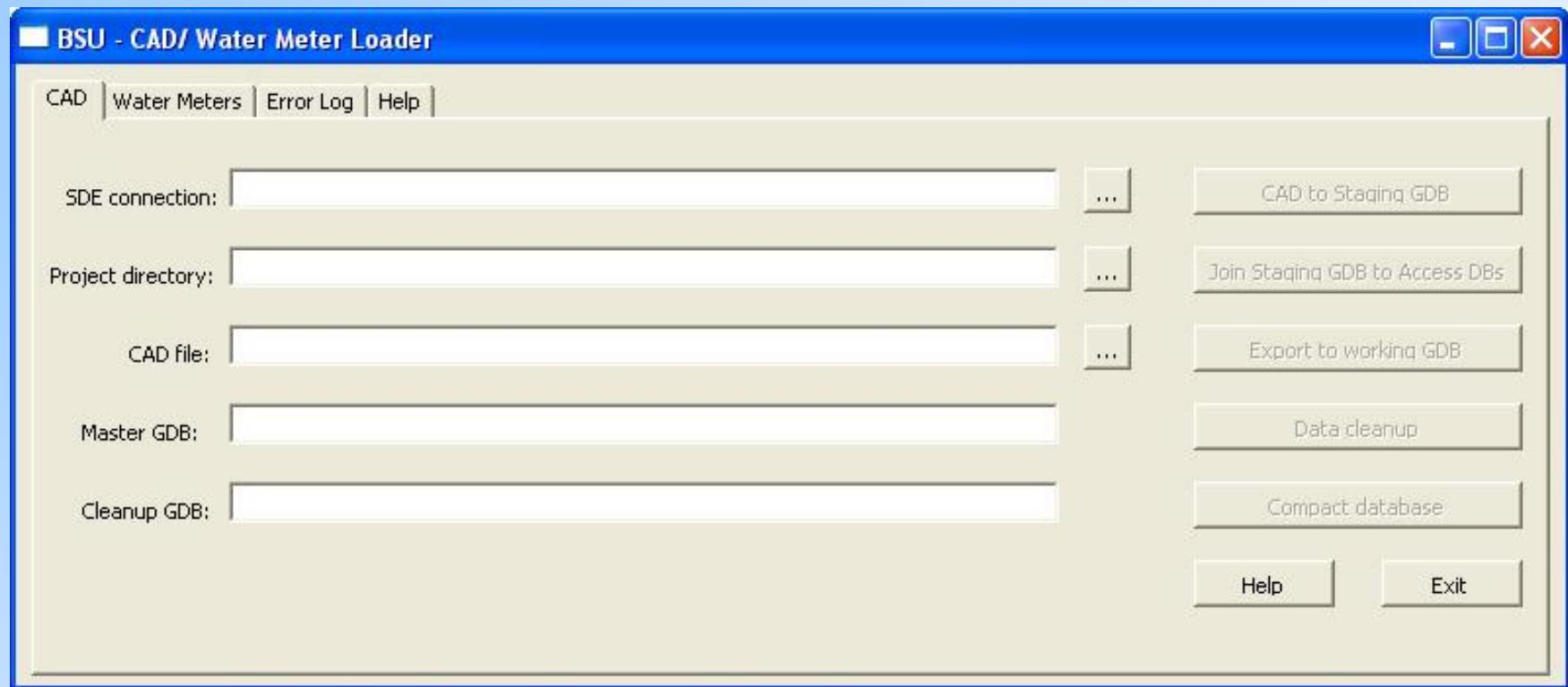
Software

- BSU stays current with all service packs and upgrades.
  - Currently running ArcGIS 9.2, service pack 2.
- BSU utilizes ArcInfo and ArcView.
  - With the ArcGIS Publisher extension, the majority of BSU employees access the GIS through the free ArcReader.
- BSU uses ArcSDE and SQL Server for its Enterprise Geodatabase.

ESRI GIS and Mapping Software

Bonita Springs Utilities, Inc.

ArcSDE/SQL Server

- Houses all spatial and attribute data as well as orthophotography (MrSID and ECW)
- Utilize Lee County data for reference:
  - Parcels, Streets, Subdivisions, ZIP Codes, and 2005 color orthophotos

Bonita Springs Utilities, Inc.

Correcting the Infrastructure

- Original dataset contained many inaccuracies (e.g., pump stations in roads, lakes, and golf greens; water mains through buildings; missing all water and sewer service laterals).

- Accuracy of existing data is continually being updated.

Bonita Springs
Utilities, Inc.

The original dataset contained lines going through buildings, pump stations in the middle of streets and misplaced manholes.
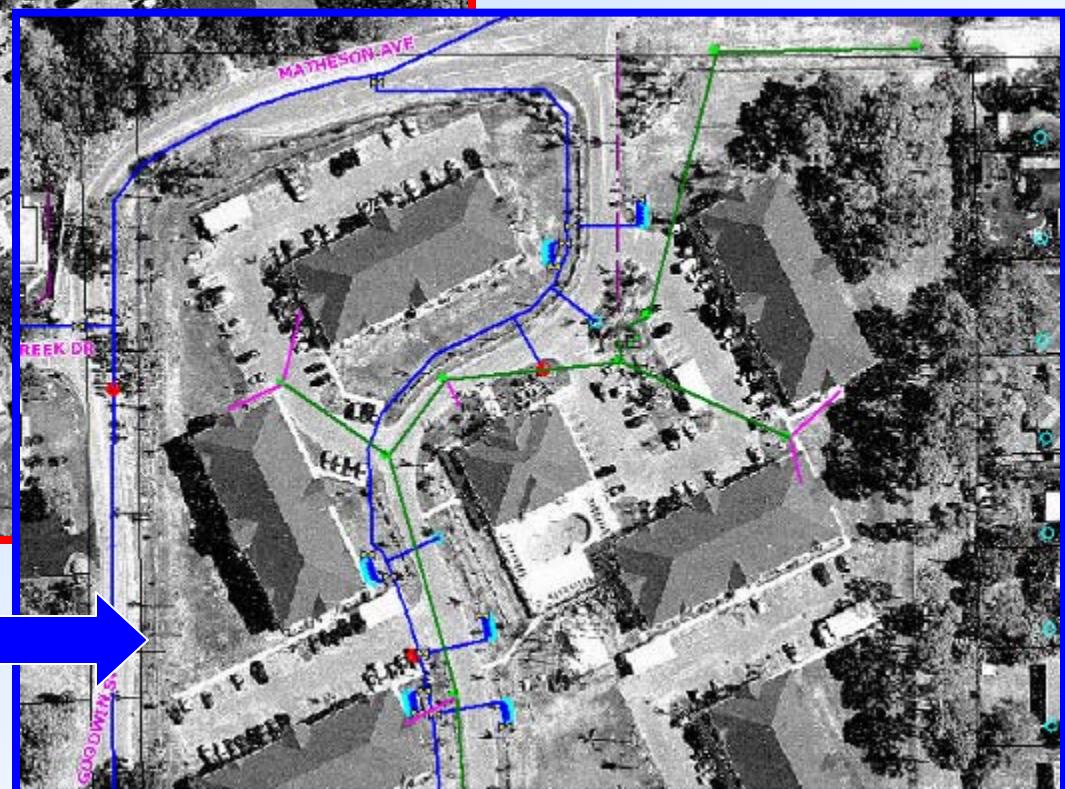
Current dataset has correctly located features and the addition of water and sewer services.

Correcting the Infrastructure (cont'd)

- Added a field called Positional Accuracy as a way to distinguish how accurate each feature is located.
  - Options include: GPS sub-meter, Traced from digital CAD file, Referenced from as-built drawing, Aligned to orthophotography, Estimated, etc.
- Field personnel still didn't know how to quickly identify which features could be quickly identified as "reliable."
- Added a layer called "Areas of Confidence" which highlights the areas that have been "attended to" by the BSU GIS department and can be trusted with a certain degree of certainty.

Bonita Springs Utilities, Inc.

Areas of Confidence
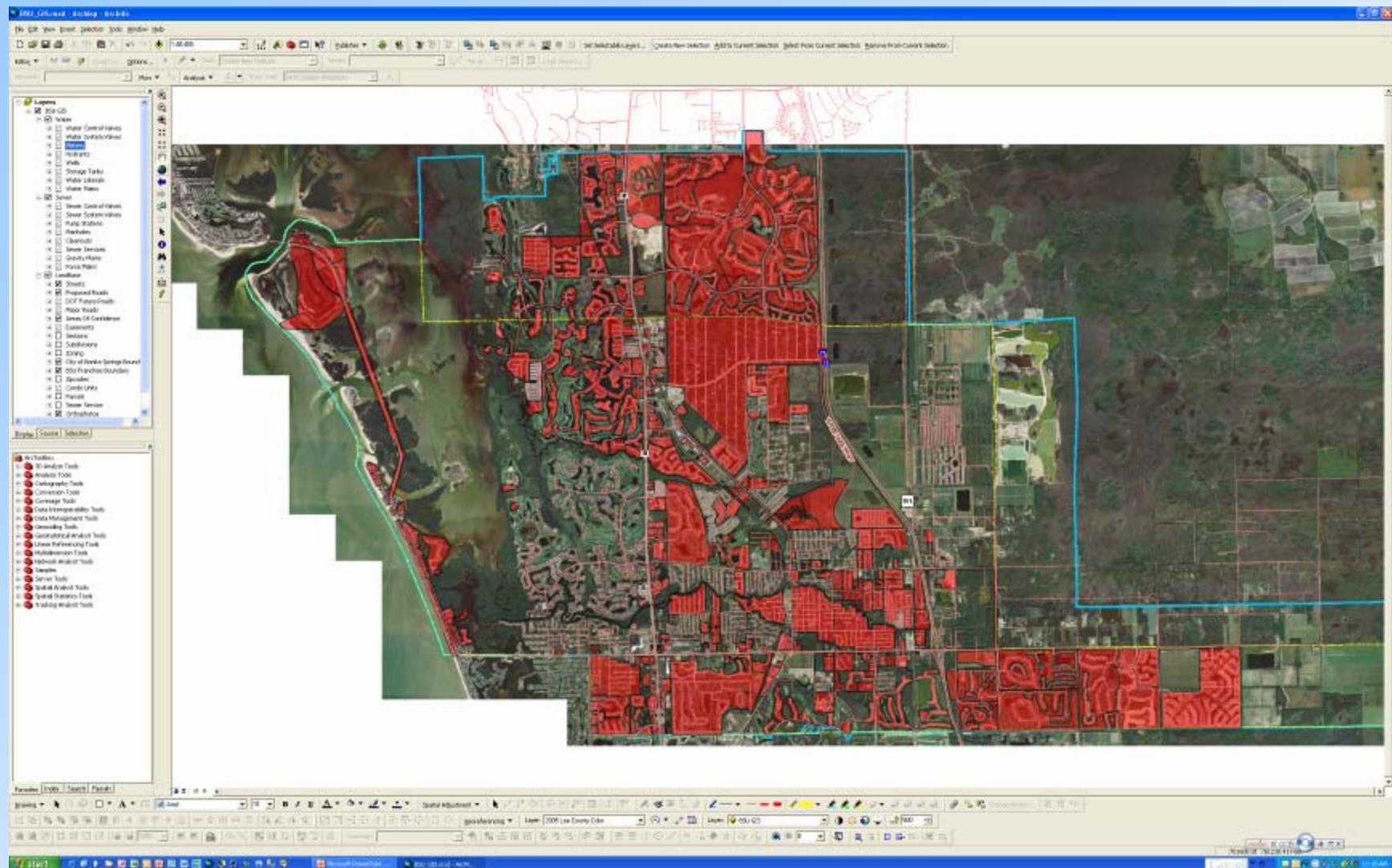
Bonita Springs Utilities, Inc.

Orthophotos

- 2005 Lee County Color vs. 2004 BSU B&W

Bonita Springs
Utilities, Inc.
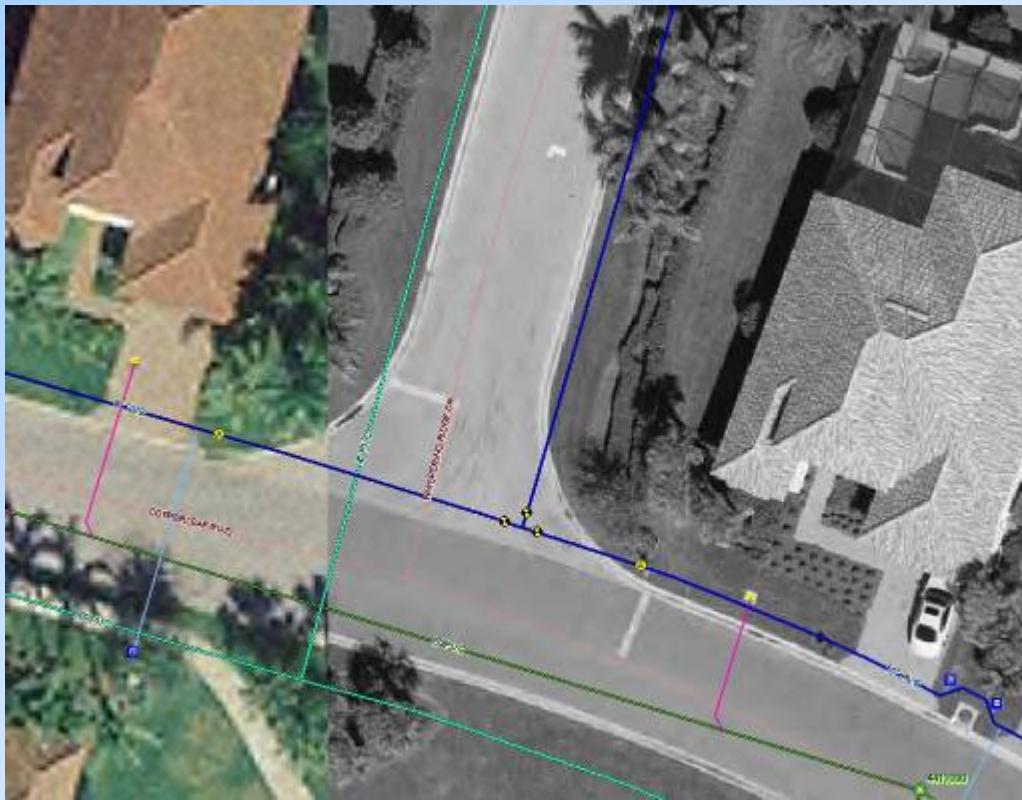
- **Ability to align features to higher resolution orthophotos**

Use of Hyperlinks in a Field

- Link directly to Records Management software (LibertyNET) to display any document (e.g., as-built plans).

- Use of SOURCEDATA field to mass populate and link multiple features to one set of plans simultaneously.

  - Eliminates the need to know what to search for in LibertyNET; click on a feature and get the desired document.

Bonita Springs Utilities, Inc.

Anything w/ the same Source Data can be queried out and mass populated w/ the same hyperlink.

Hyperlink includes software login (username/password) & search criteria to return the desired result. LibertyNET combines single scanned sheets into a complete set of plans.
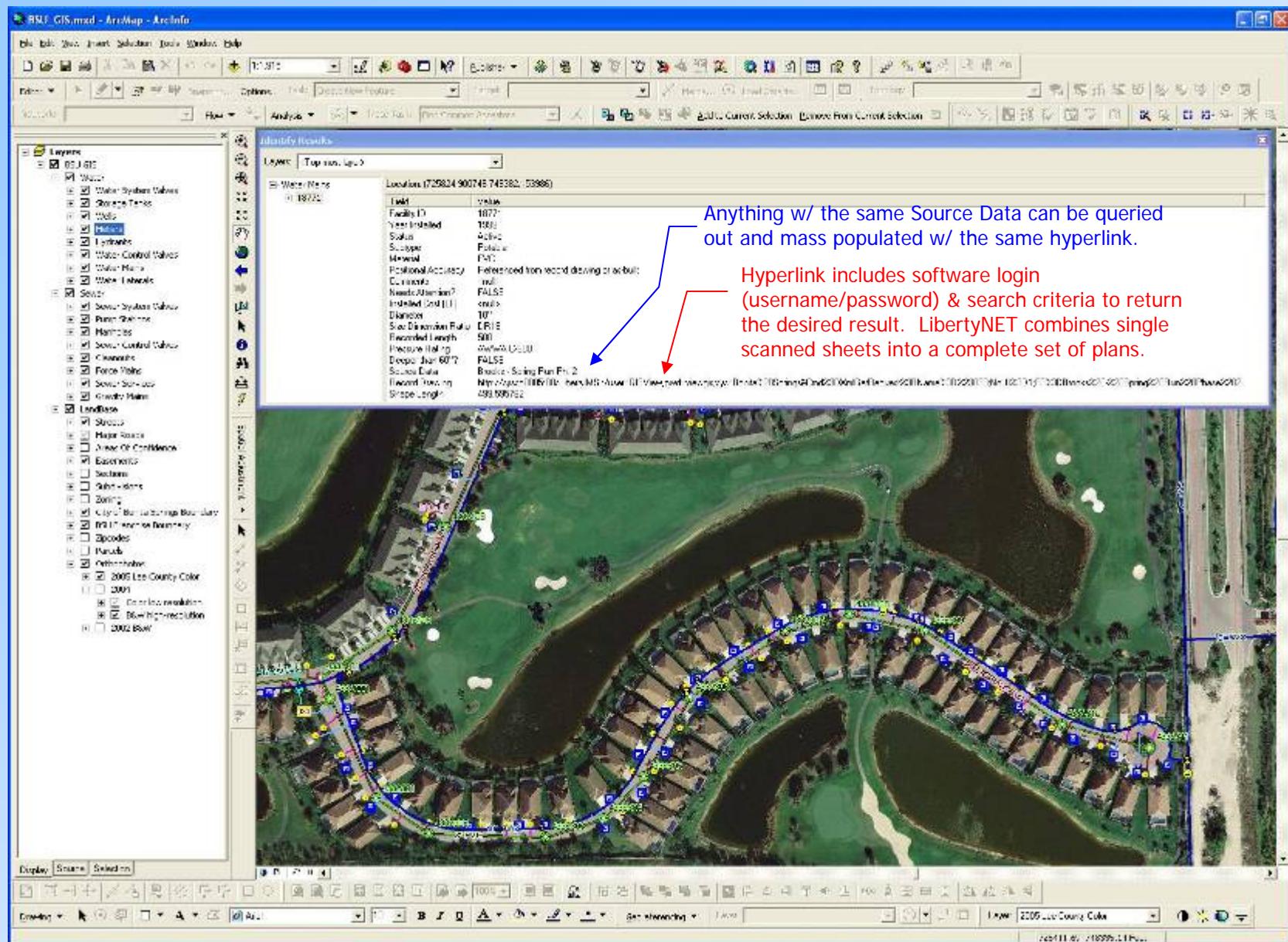
Bonita Springs Utilities, Inc.

Bonita Springs Utilities, Inc.

- Load photos of pump stations directly into an ArcSDE table that is related to the pump station features.
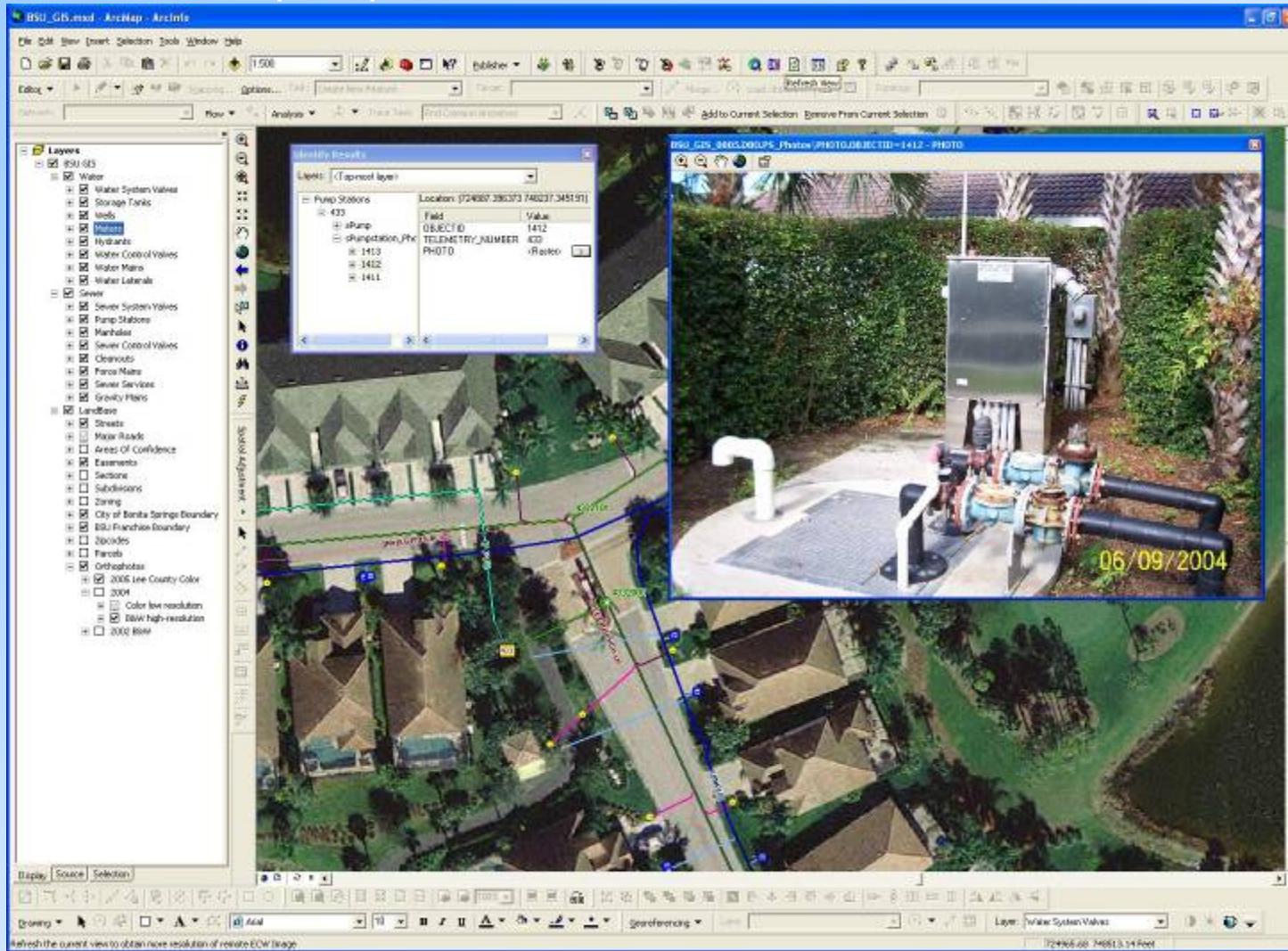
- ...also done with hydrants...
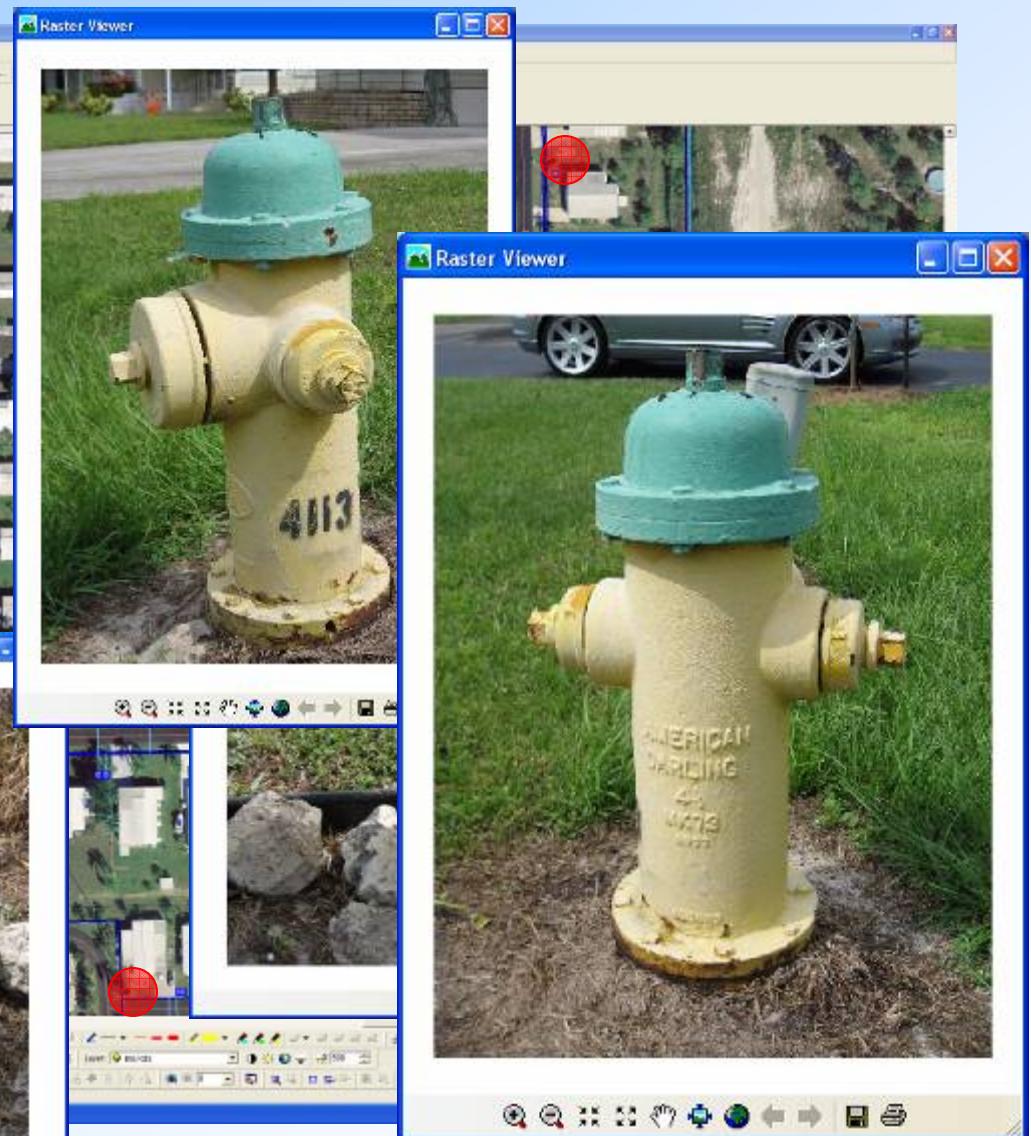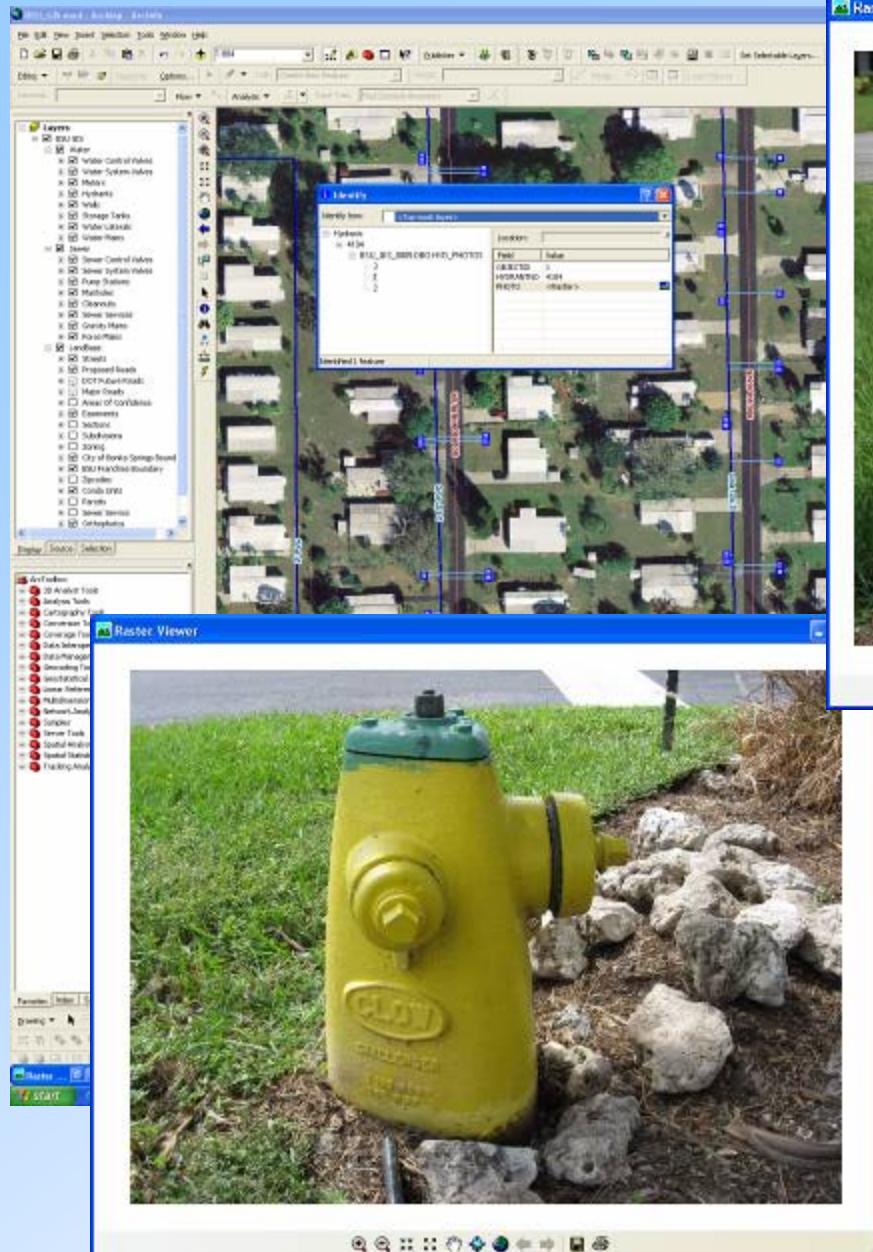
- …valves…
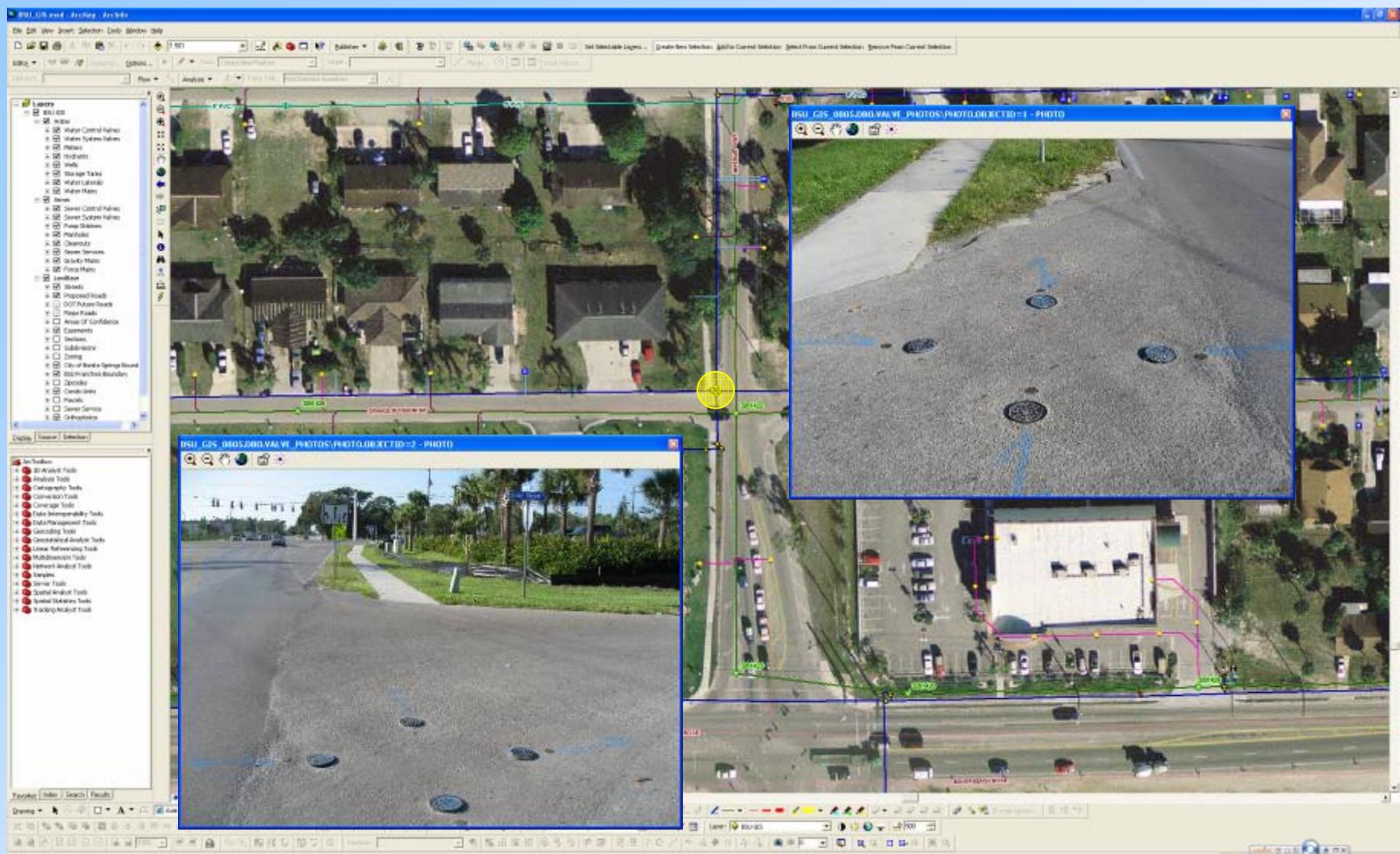
Bonita Springs
Utilities, Inc.

- …and construction photos.

- Construction photos (cont'd)

Bonita Springs Utilities, Inc.
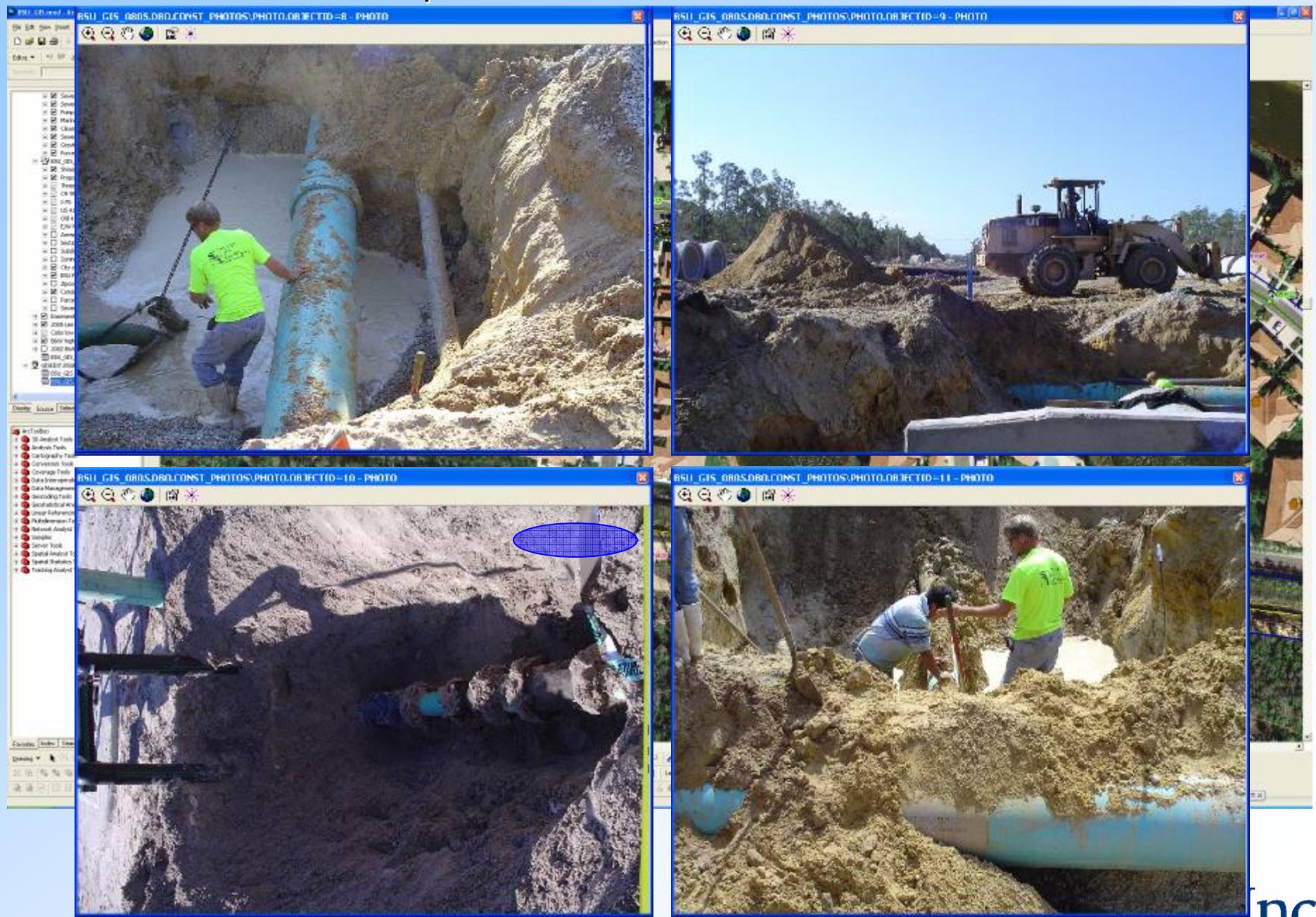
Data Flow Systems Integration

- Relate HyperSCADA server data to pump stations by common field (telemetry #).
- Ability to display large scale on-screen map showing live alarm codes for over 300 pump stations.
  - Extremely useful in emergency management situations (e.g., hurricanes) but is also used on a daily basis.
- Map is set to only label those stations that are in an alarm state rather than all of the stations.
- Map also symbolizes the stations based on whether or not the alarm has been acknowledged or not.
- Any other fields can be displayed as well such as pump data.
- Map automatically refreshes at a user set interval (BSU uses 90 seconds to allow the system to poll all stations before each refresh).
- Created with the assistance of Karl Bossert (DFS) and Michele Lundeen (ESRI WPB).
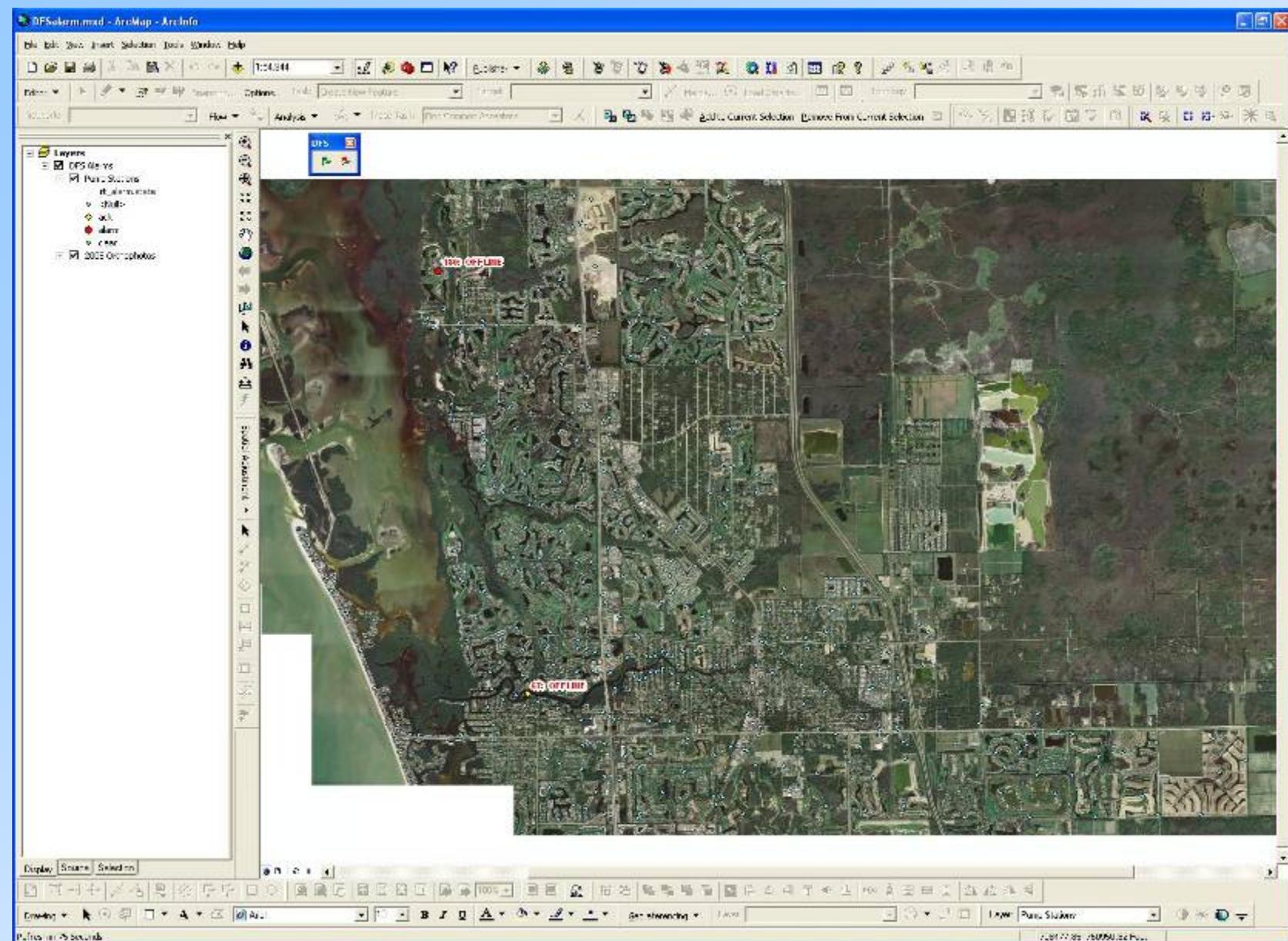
Bonita Springs Utilities, Inc.

Data Collection

- GPS with sub-meter accuracy.
- BSU has 2 Trimble GeoXTs & 5 Thales Navigation MobileMapper CEs, all with ArcPad 7.
  - Also used are Trimble's Beacon-On-A-Belt (BoB) & GeoBeacon and Thales' external antennas & precision antennas and poles to improve accuracy.
  - Units are utilized by collecting raw data and post processing to obtain sub-foot accuracy versus the sometimes sub-meter real-time corrections.
- All field personnel are trained on each unit.
- It is a requirement for the Engineering Department (Inspectors) to GPS all newly installed valves on BSU projects.

Bonita Springs Utilities, Inc.
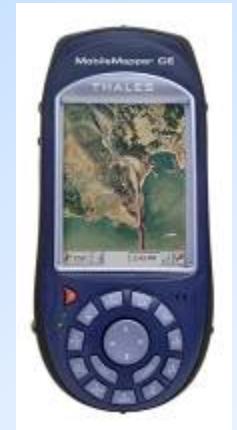
Mobility

- BSU utilizes ITRONIX Ruggedized Tablet PCs and Dell Laptops in the trucks and field.

- Deployed with a live connection to the ArcGIS Enterprise Database utilizing Sprint broadband cards and Citrix Server.
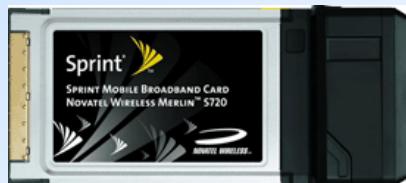
Utility Infrastructure GIS Turnover

- Before BSU accepts utility infrastructure to be turned over, a GIS requirement must be met.
  - Details are outlined in BSU Digital GIS & CAD Records Standards and Requirements document available for download from the website.
    - Constantly updated and re-posted.
  - Constantly striving to make set requirements to make the entire process easier on all parties while still gathering pertinent spatial

Bonita Springs Utilities, Inc.
Digital Geographic Information System and CAD Records
Standards and Requirements
Rewritten June 16, 2006
Revised October 31, 2006
Dominic M. Strollo II – GIS Administrator

1. **Purpose**

   1.1. These guidelines exist to assist the developer, contractor and/or engineer in meeting the performance based requirements for GIS data prior to acceptance of the utility infrastructure of a project or contract. It is the developer's, contractor's and/or engineer's responsibility to meet these guidelines in a timely fashion to allow for scheduled turnover of utility infrastructure. BSU can provide names of firms qualified to assist in this process.

2. **Overview**

   2.1. Standard hardcopy submittals for record drawings will continue to be required as has been the practice in the past. **These need to be embossed with the engineer's seal.** Record drawings can also be submitted (along with hardcopies) in Adobe .pdf and/or AutoCAD .dwg format, but it is not mandatory. In addition, developers must comply with the following digital requirements, which will be updated from time to time. Parties requesting utility turn over to BSU are responsible for contacting BSU staff to obtain the latest requirements.

      2.1.1. Duplicates of the actual paper record drawings, as submitted to BSU, must be signed, sealed and stamped. These also need to be embossed with the engineer's seal, and must be exact copies of those submitted to BSU as record drawings. In lieu of paper copies, the scan files from BSU's imaging system will also meet this requirement. You will need to arrange this through BSU staff or submit the paper copies.

   2.2. Prior to acceptance of the utility portions of the project by Bonita Springs Utilities, Inc., the developer must submit GIS data to BSU created using the BSU supplied template, ready to upload to BSU's GIS without additional manipulation or data entry. As a minimum, these files shall meet the criteria as described in this document. Deviations from these guidelines will be allowed only by written permission from authorized BSU personnel.

      2.2.1. Initial GIS submittals must be delivered to BSU on a CD with the rest of the turnover package. E-mail and/or ftp submittals are not acceptable for initial submittals. E-mail and/or ftp are only to be used to re-submit if and only if corrections to the GIS data are requested by BSU. Use of E-mail and/or ftp to re-submit GIS data must be approved by the GIS department in advance.

3. **Software**

   3.1. The GIS employed by Bonita Springs Utilities, Inc. is based upon **ESRI's ArcGIS 9** and **Microsoft SQL Server. Autodesk Map** and **Microsoft Access** are also used to capture data to be uploaded into the GIS. For more detailed information on the software packages listed above please visit the respective web sites. http://www.esri.com/, http://usa.autodesk.com/, and http://www.microsoft.com/.

      3.1.1. Kanotech Information Systems has retired the CivicCenter and Data Capture Tools product line. That being the case, BSU will no longer accept GIS infrastructure submitted utilizing their software package, effective the date of release of this document.

   3.2. The preferred format for GIS submittals is an ESRI personal geodatabase; shapefiles will only be accepted by obtaining approval in advance from the GIS department. This will allow for seamless uploading to the GIS employed by BSU. If the necessary software packages to create the GIS infrastructure are not owned, it is the responsibility of the firm submitting GIS data to hire a qualified firm to capture the GIS data for them.

      3.2.1. The minimum ESRI ArcGIS software license required to utilize BSU's personal geodatabase template is ArcView 9.1.

Bonita Springs Utilities, Inc.
Release of GIS Data Form

Specific Data Requested Including Description of Area and its Intended Purpose:

_____

_____

_____

_____

_____

_____

_____

Format:	Paper Map ☐	Size:	8½ x 11 ☐
	Digital Map (.pdf) ☐		11 x 17 ☐
	Digital File(s) Export (.shp) ☐		24 x 36 ☐
	☐		other ☐

Requested By: _____   Request Date: _____
printed name and title

                                     Phone: _____

Company: _____   e-mail: _____

Approved By: _____   Date: _____
(one signature required)   Fred Partin, Executive Director

_____   _____
Michael J. Liggins, P.E., Director of Engineering

_____   _____
Mel Fisher, Director of Operations

_____   _____
Cynthia McHenry, Manager of Information Systems

Released By: _____   Release Date: _____
Title: _____

Warning For Official Use Only – Protected Under Florida Statute Chapter 281.301
Information released is exempt from the Freedom of Information Act (FOIA)
and any authorized individual who knowingly or recklessly divulges information may be imprisoned.

Please note that Bonita Springs Utilities, Inc. does not warrant the accuracy, reliability or timeliness of information released and assumes no legal responsibility; persons relying on this information do so at their own risk. Public information sources should be consulted for verification of information herein contained and the Bonita Springs Utilities, Inc. GIS Department should be notified of any discrepancies.

Form IT-GIS-083106.1 rev B

Bonita Springs Utilities, Inc.

Review Process

- Turnover package is submitted to the engineering department along with GIS data on a CD, which is sent to the GIS department for review.
  - Most minor discrepancies can be fixed by BSU and clarified through e-mail or phone.
  - If as-built CAD file is submitted in the correct coordinate system with all layers (a requirement), BSU will fix most of the issues 99% of the time.
  - Sloppy drafting (proper snapping is crucial!) or missing items from specifications will lead to the submittal being sent back for corrections, which can hold up BSU from releasing the meters (i.e., water service) to the project.
  - FTP site has been set up to re-submit the GIS package.

Bonita Springs
Utilities, Inc.

Topology in pGDB Reviews

Once rules are set up, points of non-conformance are readily identified.
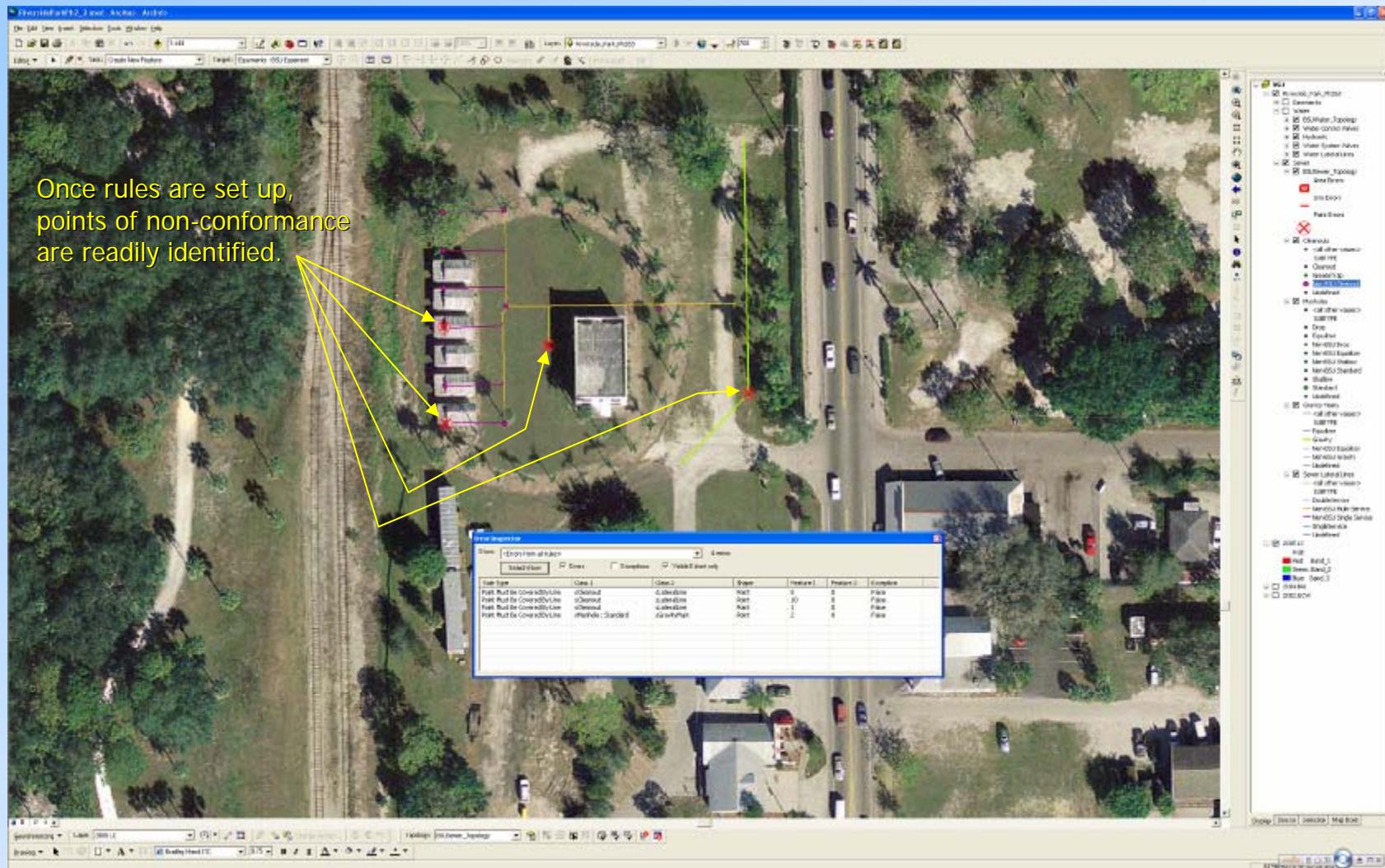
Bonita Springs Utilities, Inc.

Geoprocessing w/ModelBuilder

- Makes repetitive tasks more productive.

Simple: Calculating the slope for selected gravity mains.
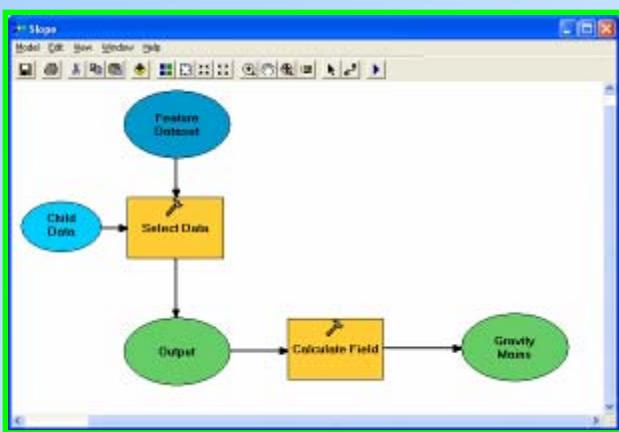
Moderate: Calculating Latitude/Longitude in DD and DMS as well as state plane coordinates for selected features.

Complex: Selection of features from all feature classes by a specific attribute.

Bonita Springs Utilities, Inc.

Review Tracking

- Excel spreadsheet used to track GIS project metadata.
  - Includes all pertinent contact information
  - Houses all comments of items that have been or need to be addressed
  - Disclaimer to sign off at bottom

Bonita Springs Utilities, Inc.

GENERAL INFORMATION

Project Name:	Enter information here
Design Engineer Company:	Enter information here
Design Engineer Phone:	Enter information here
Design Engineer Name:	Enter information here
Design Engineer E-mail:	Enter information here
GIS Data Creator Company:	Enter information here
GIS Data Creator Name:	Enter information here
GIS Data Creator Phone:	Enter information here
GIS Data Creator E-mail:	Enter information here
Primary Contractor Name:	Enter information here
Year of Installation:	Enter information here
Date of GIS template:	Enter information here

Enter Totals Here

REVIEW SEVERITY LEVEL

No issues present.
Required field missing or incorrect data.
Feature not captured correctly.

review date

GIS submittal format

- ⦿ ESRI gdb
- ○ Kanotech

Feature Groups Captured

Group	Feature	D	E
Sewer Lines	Sanitary Sewer Manholes	0	0
	Gravity Main segments	0	
	Force Main segments	0	
	Sanitary Service Lateral segments	0	0
	Sanitary Sewer Pump Stations	0	0
	Clean Outs / Grease Traps, etc.	0	0
Sewer Valves	Plug Valves	0	
	Air Release Valves	0	
	Other	0	0
	Total Sewer Features:		0

FOR REVIEW COMMENTS ONLY

Group	Feature	D	E
Water Lines	Raw Main segments	0	
	Potable Main segments	0	
	Fire Lateral segments	0	
	Hydrant Lateral segments	0	
	Water Service Lateral segments	0	0
Water Valves	Gate Valves (in-line, hydrant, fire, service)	0	
	Backflow Preventers / Check Valves, etc.	0	
	Blow Off Valves	0	
	Air Release Valves	0	
	Other	0	0
	Hydrants	0	0
	Total Water Features:		0

BSU: Insert your company name here.

Group	Feature	D	E
Land Base	Easements	0	
	Other	0	0
	Total Land Base Features:		0

	D	E
Total GIS Features Captured	0	0

NOTE: Count Table contains formulas. Use caution when altering table format to ensure that totals shown are correctly reflected. Not all projects will have all feature groups. These numbers should match the final construction pay request quantities.

XYZ Engineering, Inc.
acknowledges that the turn over to Bonita Springs Utilities of utilitiy infrastructure for operation requires the delivery of digital data in a GIS format that is ready to upload to their master GIS system and that turn over will not be accepted until that requirement is completed.

H ◄ ► H \ General /

Bonita Springs Utilities, Inc.

Training

- Along with training of all BSU personnel, we also offer training to assist with GIS turnover projects.
  - We offer on-site training on how to prepare a GIS submittal using ArcView and our personal GDB template.
 - Also available for support by phone or e-mail.

Bonita Springs
Utilities, Inc.

The Road Ahead…

- Assist the Engineering Department with modeling integration (WaterGEMS).
- Continue with the deployment of a mobile GIS.
- Implement our new meter application that JEA has migrated to a .NET environment.
- Make our GIS a smarter, more analytical solution with the use of Topologies and Geometric Networks.
  - Isolate water main breaks to determine which valves to shut off as well as to create automated mailings to those customers affected (boil water notices).
- Automate more tasks with ModelBuilder.
- Utilize data collected from valve exerciser.

Bonita Springs Utilities, Inc.

Granite XP

- Await arrival of new camera truck with Cues Granite XP sewer inspection software.
- ESRI module allows seamless integration to existing infrastructure for quick access to inspection reports, pictures and videos.
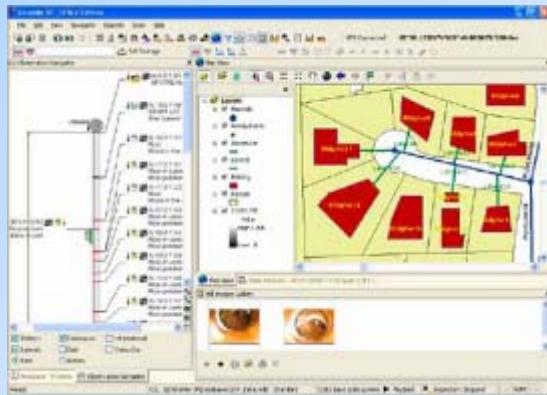
Easement Mapping

- It has been made a requirement to submit the utility easement(s) as part of the infrastructure turnover process (polygon feature class).
- BSU has roughly 3,000-3,500 easements that need to be put in GIS.
- Work with JEA to capture the easements utilizing COGO.
  - In the process of determining how accurate the easements need to be
    - Possibility of surveying section corners or even every point of beginning

Bonita Springs
Utilities, Inc.

Questions/Contact Information.

- **Dominic M. Strollo II**
  GIS Administrator, Bonita Springs Utilities, Inc.
  (239) 390-4973 dstrollo@bsu.us

- **Mark W. Nelson, P.E.**
  Director of GIS, Jones Edmunds & Associates, Inc.
  (352) 377-5821 mnelson@jea.net

- Dave Jenkins
  GIS Analyst, Jones Edmunds & Associates, Inc.
  (352) 377-5821 djenkins@jea.net

- Kevin Hofmann
  GIS Analyst, Bonita Springs Utilities, Inc.
  (239) 390-4981 khofmann@bsu.us

www.bsu.us
www.jonesedmunds.com

JONES EDMUNDS
ENGINEERS | ARCHITECTS | SCIENTISTS

Bonita Springs Utilities, Inc.