



Real Time As-Builts

Integrating Survey and GIS REST Feature Services

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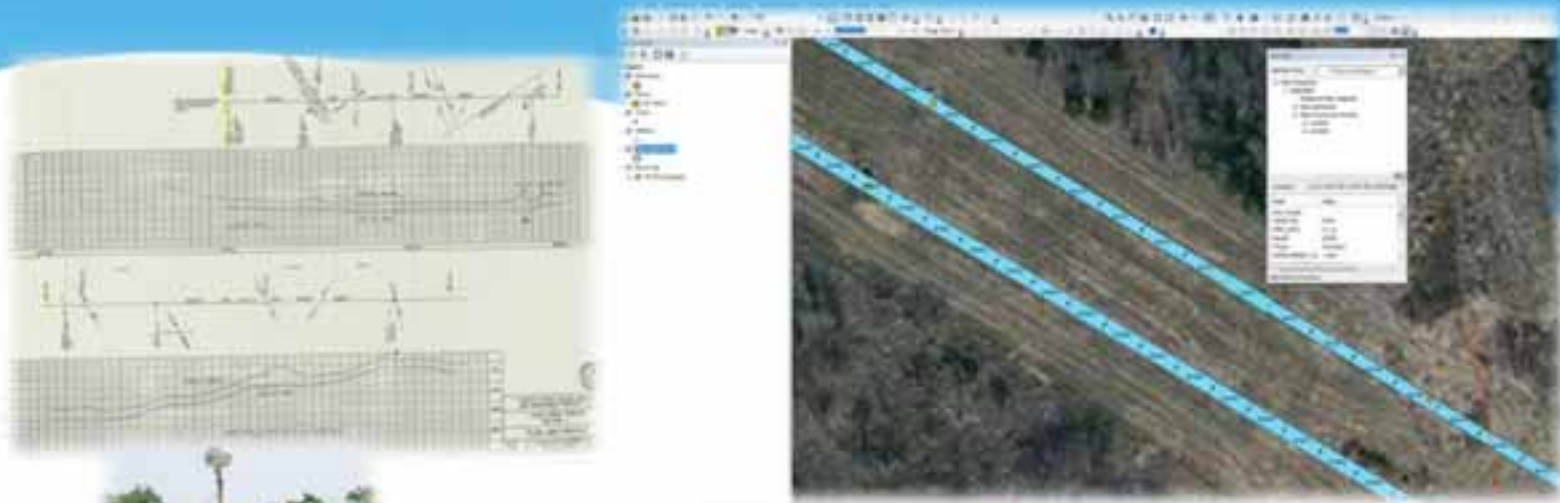
Integrated Pipeline (IPL)



The IPL is a regional partnership between TRWD and Dallas Water Utilities (DWU) dedicated to designing, building, and operating a raw water pipeline to proactively address the demand for additional water supply to the DFW region.

- The pipeline will extend **150 miles** and integrate with current TRWD & DWU water supply systems to deliver a combined **350 MGD** of raw water.
- 350 MGD is the equivalent of filling **530** Olympic-size swimming pools every day!

Brief Evolution of TRWD's Pipeline GIS



The Problem. The Request. The Solution.

The Problem

Accuracy and Timeliness

The Request

Provide real time GIS data with sub-decimeter accuracy during construction of the IPL

The Solution

Real-Time As-Builts Survey Project (RTABS)



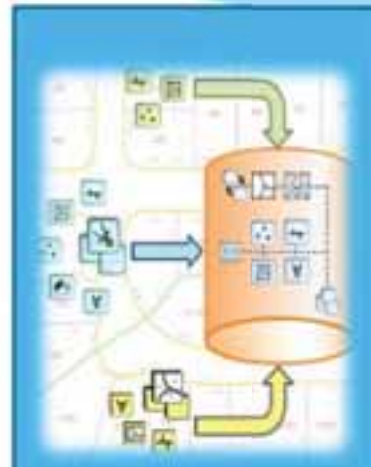
What is a “Real Time As-Built”?



Pipe Manufacturer Reporting Process



Survey Control Process



Database Input



Enterprise Usage

“Achieving Survey Quality Data of Pipeline “As-Built” in Real Time”

RTABS Solution Elements: Program QAQC



Pipeline features designed by each of the IPL Design Teams.



Pipeline Segments from each pipe manufacturer to denote the location, type, Pipe ID, and orientation of each segment (Pipe Manufacturer Lay Sheets)

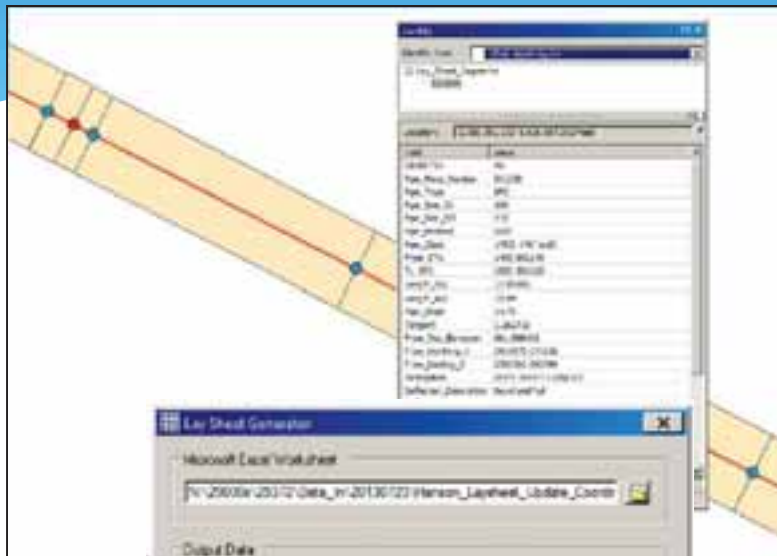


Pipeline features collected by pipeline inspectors, “As-Built” GIS Model



QAQC Survey Data and provide real time access to As-Built

RTABS Solution Elements: Lay Sheet Generator



| | A | B | C | D | E | F | G | H |
|----|------------------|-----------|--------------|--------------|---------------|------------------|----------|---------|
| 1 | Pipe_Line_Number | Pipe_Type | Pipe_Size_ID | Pipe_Size_OD | Pipe_Material | Pipe_Class | From_STA | To_STA |
| 2 | 11117 | S/C | 136 | 111.00 | WSP | 175(6.250" Wall) | 1+05.78 | 1+01.43 |
| 3 | SK082 | SPC | 100 | 110.00 | WSP | 175(6.470" Wall) | 1+30.42 | 1+72.43 |
| 4 | 541010 | S/C | 136 | 112.00 | WSP | 175(6.250" Wall) | 1+72.98 | 2+04.39 |
| 5 | SK2094 | SPC | 100 | 110.00 | WSP | 175(6.470" Wall) | 2+01.29 | 2+25.43 |
| 6 | W1018 | 111 | 136 | 111.00 | WSP | 175(6.250" Wall) | 2+25.98 | 2+77.1 |
| 7 | B1009 | 111 | 100 | 111.00 | WSP | 175(6.250" Wall) | 2+77.1 | 2+25.00 |
| 8 | 0306 | S/C | 136 | 110.00 | WSP | 175(6.470" Wall) | 2+79.02 | 2+79.11 |
| 9 | SK1007 | SPC | 100 | 110.00 | WSP | 175(6.470" Wall) | 2+79.77 | 2+88.56 |
| 10 | 0306 | 111 | 136 | 110.00 | WSP | 175(6.470" Wall) | 2+88.56 | 2+88.33 |

- Pipe manufacturers provide the proposed pipe segment construction order as Lay Sheets
- Lay Sheet data is delivered as a MS Excel file
- The Lay Sheet Generator reads the excel files and creates feature classes that represent the pipe segments

RTABS Solution Elements: Survey Equipment

GPS Receiver: Trimble R8-4



Data Logger: Trimble Tablet Rugged PC

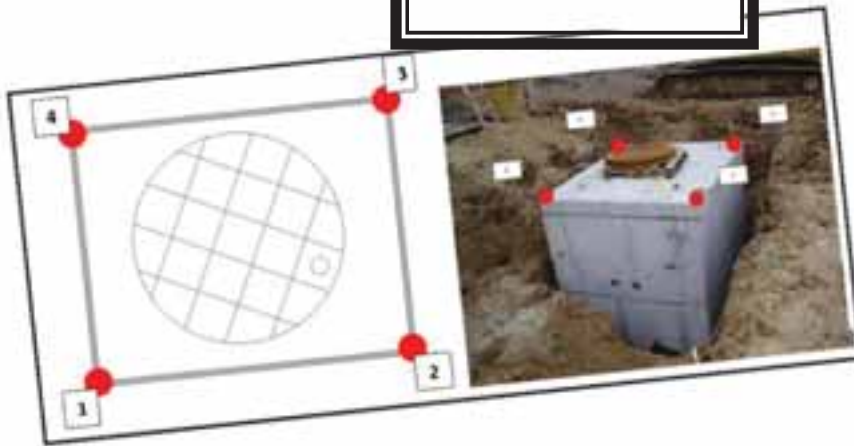
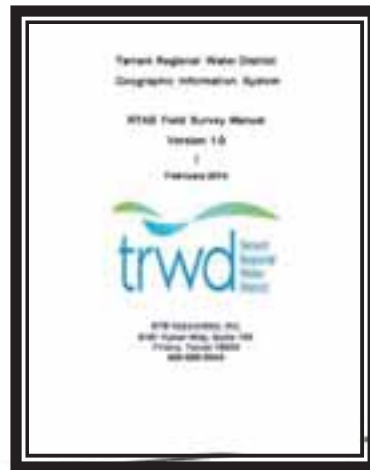


Software: Trimble Access/GPS Import Tool

Communication: Internet Hotspot (MiFi)



RTABS Solution Elements: Data Survey



- Using the RTABS equipment and a set Trimble Data Dictionary, assets are surveyed
- All assets are surveyed using a TRWD Standard Operating Procedure

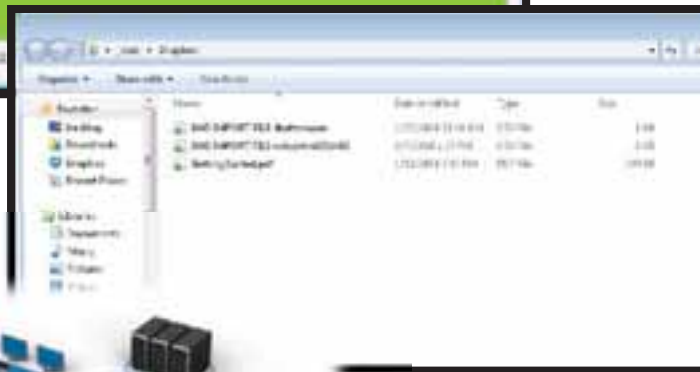
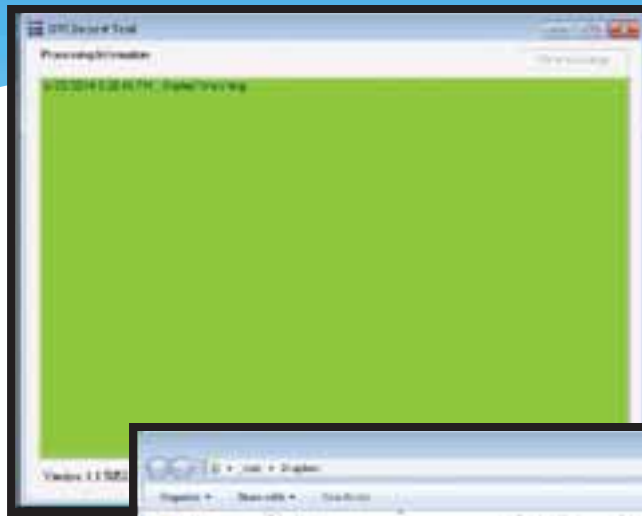
RTABS Solution Elements: Data Delivery

- CSV files are directly exported from Trimble Access
- Utilizing a cloud storage “exchange”, the CSV file is exported to a location on the secure TRWD Network
- Nothing gets lost in translation, there is **always** an archive on file



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File Edit Format View Help
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RTABS Solution Elements: Data Exchange



- The Halff GPS Import Tool, a custom Window's listener application, listens for CSV files on a dedicated TRWD Server
- When the Halff GPS Import Tool hears a file, it parses the data out to it's individual feature classes utilizing ArcGIS for Server REST Feature Services
- If a CSV file has errors, it is redirected to a "Bad Import" folder location
- Again, *nothing* gets lost in translation

RTABS Solution Elements: Data Management

The GPS Import Tool plots the location and populates the attributes of the CSV file to the appropriate REST Feature Service, which is determined by the Trimble Feature Code selected by the field collector.



Table

Vault

| OBJECTID* | NORTHING | EASTING | ELEVATION | COLLECTED BY | COLLECTED DATE | VAULT TYPE | VAULT DIMENSIONS | NOTES | SHAPE* |
|-----------|-------------|------------|-----------|--------------|----------------|------------|------------------|-------|--------|
| 2 | 6967225.709 | 2325649.83 | 439.205 | imb | 1/17/2014 | vaive | 60" Diameter | na | Point |

RTABS Solution Elements: Data Usage

Within Minutes... the data is available for consumption via

- Web Applications
- Mobile Devices
- ArcGIS for Desktop

Which provides... real time access to pipeline “As-Built” data



RTABS Solution Process Summary



Surveying Assets



Secure Cloud "Exchange"



TRWD Network & Listener

RTABS Process



Utilizing Data



Importing Data



Lessons Learned

- Set realistic expectations and timelines!
- Do not retrofit your organizations data and processes to fit with a third party application!
- If you can, work with GPS Collectors you are familiar with and consulting firms who know your organization.
- ***Keep it simple.***

Thank You!

