GPS For As built Data Collection of Utility Construction
Agenda

- Company Information
- GPS Implementation
- Live Demonstration
- Questions
A Family of Companies

Electric Generation and Distribution

Natural Gas Distribution

Electric Transmission

60% ownership
WEC Energy Group

- Focused on the fundamentals:
  - World-class reliability
  - Operating efficiency
  - Financial discipline
  - Exceptional customer care
Serving the Region’s Energy Needs

- We Energies
- Michigan Gas Utilities Corporation
- Minnesota Energy Resources Corporation
- North Shore Gas Company
- The Peoples Gas Light and Coke Company
- Wisconsin Public Service Corporation
GPS Implementation
Precursor to GPS

- **Issues**
  - As built measurements were inaccurate/confusing leading to inaccurate maps
  - Facilities can be time consuming and difficult to locate
  - Cycle time from as built in the field to mapping completed was too long

- **Identified Goals**
  - Uniform process for GPS as built data collection
  - Centrally managed GPS data repository
Precursor to GPS

Example As laid Page
Precursor to GPS

- GPS became a more viable option
  - Regulatory requirements for system integrity
    - Requirements for better records
    - Records needed for analytics and risk modeling
  - More efficient work processing
    - Need for quicker turnaround
    - Budgetary constraints
- Conflation of GIS
  - Improved spatial accuracy of GIS
- Cost of technology
Precursor to GPS – Mapping Conflation

Before Conflation

After Conflation
Implementation of GPS at We Energies

- **Research & Evaluation**
  - Software & GPS devices
    - Tablet with external antenna
    - Geo 6 Series vs Geo 7x
    - Trimble Software & Pathfinder Toolkit

- **Proof of Concept**
  - Gain an understanding of the magnitude of effort
    - Purchase Units and development tools
    - Build prototype application for field collection
    - Prove wireless data transfer
    - Discover requirements for post-processing automatically
Implementation of GPS at We Energies

- Pilot Projects
  - Valve Pilot
    - Collect Sub-Meter GPS Positions for gas valves
    - Develop database and web application to store and view GPS data
    - Analyze overall results
  - Construction Pilot
    - Collect GPS positions and minimal attribute information for gas facilities
    - Use GPS data to assist in creating electronic “Main As Laid” and documenting Service Record changes
    - Provide Maps & Records with GPS Data & related facility information
Implementation of GPS at We Energies

Expected Benefits

- Significant reduction in the amount of time to collect “as-laid”
- Significant reduction or elimination of the mapping backlog
- Improved cycle time for mapping changes thus increasing field safety
- Future abilities to locate facilities using GPS
GPS Tools Implemented

- Handheld with data collection software
- Web Repository/Viewer
- Wireless Sync Capabilities
- Real-time Correction using WISCORS
- Post Processing using WISCORS data
- Interface to GIS Application
- Interface to Asset Record Systems – in development
Demonstration of Process
GPS Technology Concept

- Corporate GPS Repository
- Corporate GIS Environment
- Internet
- Gas Field Inspectors

Asset Management Systems

Maps & Records, Gas Control, Etc.
GPS Process Implemented

- Wireless Sync & Post Processing
- Field Collection
- GPS Repository
- Mapped in GIS
- Interface to Create Features
GPS Demonstration

Collecting a Feature

Collect | Saved(54)
GPS Demonstration

Additional Functionality

- Sub centimeter precision
- Laser Rangefinder to record offsets
- Photos and Videos for clarity in mapping
- Wireless data transfer
- WISCORS connectivity
GPS Demonstration

GPS Repository
GPS Demonstration

GIS Interface
GPS Demonstration

GIS Interface - Main
GPS Demonstration

GIS Interface - Services
Current & Future State of GPS
Current State of Implementation

- 212 devices for As-built Data Collection (~140 in the field)
- Locating Capabilities
- Repository as of 5/10/16:
  - 1,845 Projects
  - 114,626 Features collected
  - Average Horizontal Precision: 1.43 inches
    - 56% of all points are within 0.4 inches
    - 83% of all points are within 1.5 inches
    - 98% of all points are within 1 foot
Benefits Realized

- Reduction in As-built time in field
- Improve cycle time from construction complete to record keeping complete
- Increased accuracy of facility locations
  - Valves, corrosion, etc.
- Elevations for facilities are being captured
- Centrally stored facility GPS data
- Improved consistency of information from the field
Challenges Faced

- **Device Use**
  - Ensuring proper data collection
  - Consistency in precision/accuracy
  - Verifying data collected is accurate

- **Interpretation of data for mapping**
  - Working with precisions
  - Using point data to develop line work

- **Use of vertical elevation data**
  - Without finished grade measurements
  - Without surveying skills/tools
Future Plans

Fully Develop Locating Functionality

frmGPS  12:47
5/6 0:00 22.0 ft PPA
All Valves
00588

Start Walking

Point Accuracy: 10 cm

Collect Locate GPS Realtime

frmGPS 12:51
6/8 0:00 19.7 ft PPA
All Valves
00588

203 feet

frmGPS 12:55
7/9 0:00 19.0 ft PPA
All Valves
00588

6 inches

Point Accuracy: 10 cm

Collect Locate GPS Realtime

**Course Locked**
Future Plans

- Develop, Pilot, & Prove GPS Technology
- Gas Construction As built Data Collection
- Mapping from GPS data
- Interface with Asset Management Systems
- Investigate Design with GPS
- Gas Maintenance As built Data Collection
- Expansion to Other Workgroups & Additional Ideas

Additional Ideas:
- Electric Operations
- Power Generation
- Compliance Inspections
Questions
Contact Information

- Hasan AbuLughod - Engineer
  - hasan.abulughod@we-energies.com
  - 414-221-4842

- Matt Fehler – Operations Manager
  - matthew.fehler@we-energies.com
  - 414-944-5646

- Elizabeth Jost – Supervising Engineer
  - elizabeth.jost@we-energies.com
  - 414-221-3362
Thank You!