



Liberty UtilitiesSM



Liberty Utilities

NEPSR Seminar October 21-22, 2014

Underground Facility Record Keeping - GPS

Overview

- Background
- GPS Selection
- GPS Data Collection Requirements/Process
- Integration into GIS
- Challenges/Obstacles
- Future Initiatives
- Questions

Corporate Information

Liberty Utilities New Hampshire:

Electric distribution company with 43,000 customers serving 21 communities.

Previous company names: National Grid, Granite State Electric

Natural gas distribution company with 90,000 customers serving 30 communities.

Previous company names: National Grid, Energy North, Keyspan

Parent Company: Algonquin Power and Utilities Corp. Oakville, Ontario, Canada

<http://algonquinpower.com/static/home.html>

Liberty Utilities is a regulated water, natural gas and electric transmission and distribution utility, delivering services to nearly half of a million customers across the United States. With a local approach to management, service and support, we deliver efficient, dependable services to meet the needs of our customers.

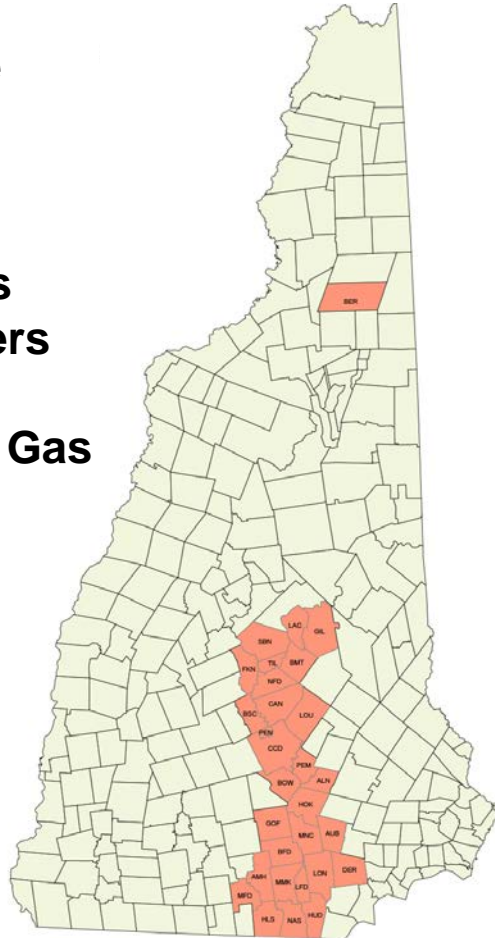
Liberty Utilities currently operates in Arizona, Arkansas, California, Georgia, Illinois, Iowa, Massachusetts, Missouri, New Hampshire and Texas.

Liberty Utilities - NH Service Area

New Hampshire Natural Gas Service Area

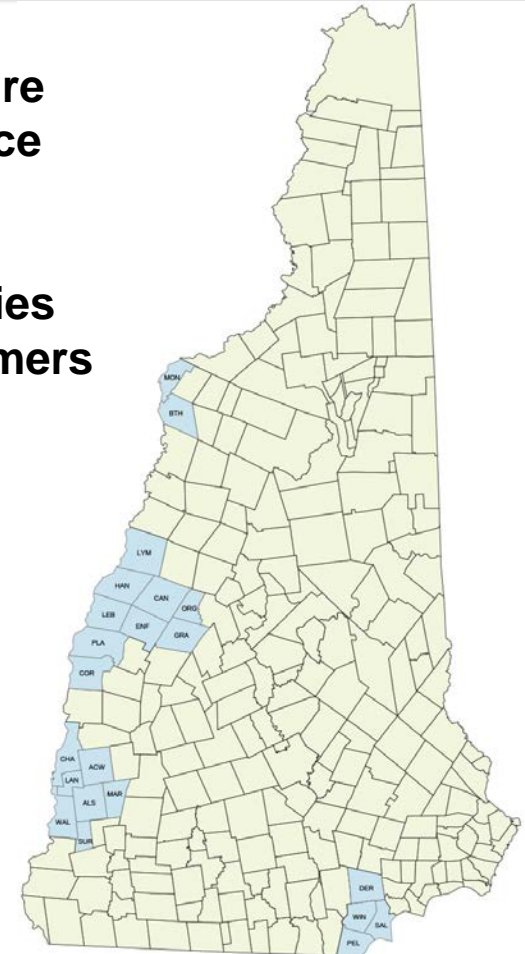
30 Communities
90,000 Customers

Largest Natural Gas
provider in NH



New Hampshire Electric Service Area

21 Communities
43,000 Customers



GPS Selection Process

- Hardware
 - Accuracy
 - Durability
 - Transportability
 - External Antenna
 - Other Capabilities
- Software/Services
 - Real-time Differential Data Correction
 - Immediacy
 - Can be unreliable
 - Costly
 - Post-processed Differential Data Correction
 - Better accuracy and reliability
 - After the fact
 - Post-processing software
 - Automated GIS uploads
- Overall Cost



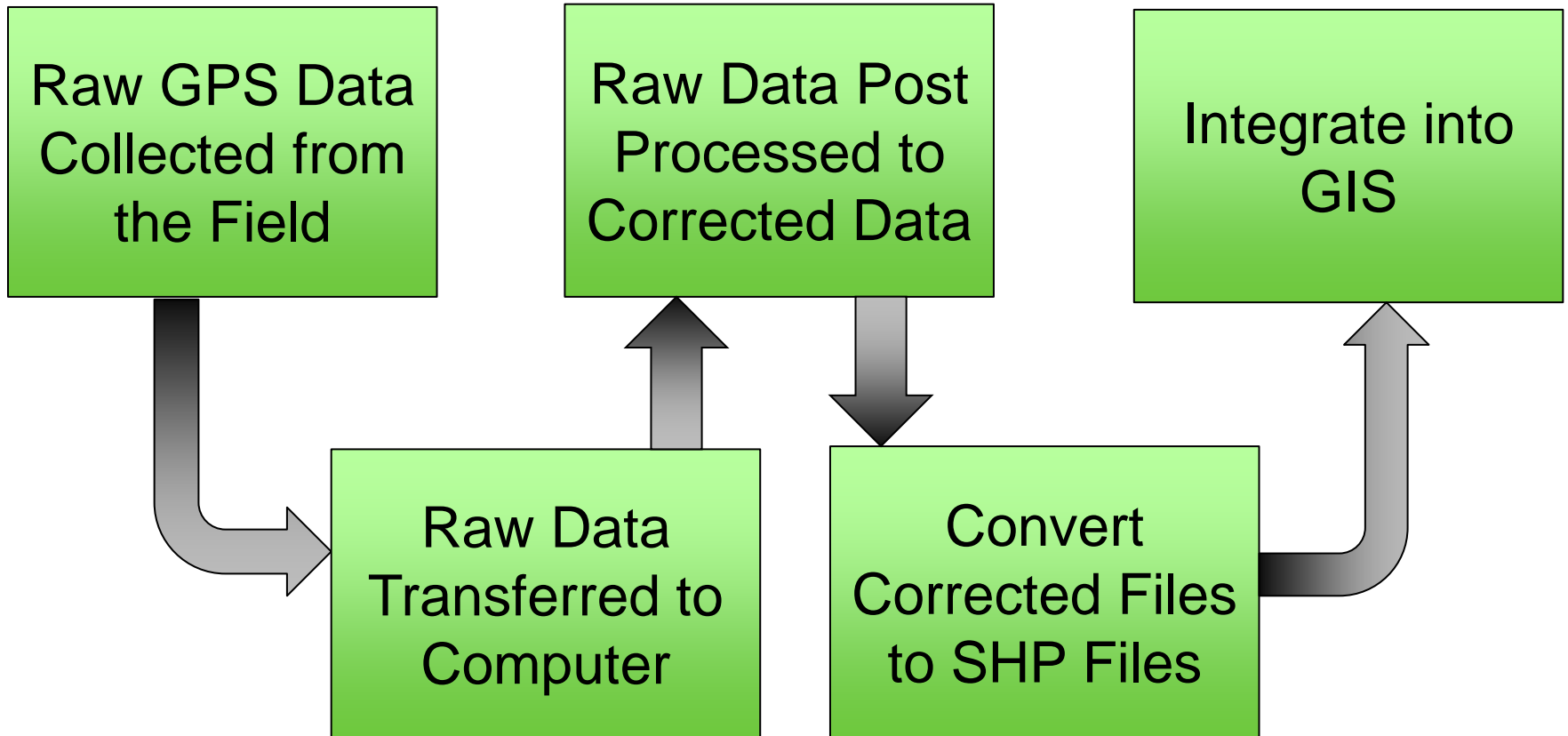
Trimble GEOXH6000

- Hardware
 - Trimble GEOXH6000
 - Zephyr 2 External Antenna
 - Floodlight Technology
 - Wi-Fi & Bluetooth capable
 - 5 Megapixel Camera
 - Battery Life
- Software/Services
 - Windows Mobile
 - TerraSync - Professional Edition
 - Decimeter Accuracy
 - Pathfinder Office
 - Design Data Dictionary
 - Post-processing Data Correction
 - Create Shape Files
- Overall Cost
 - 28 GPS Units (18 Contractor, 10 In-House)
 - ~ \$10-11k per Unit

Trimble GEOXH6000



GPS Process




GPS Data Requirements

Mains:

- Every joint/fuse or 40 feet along the main
- Any point where there is a change of direction (Elbows)
- Exposed or new crossings of other utility, municipal or other underground facilities
 - Clearance less than a 12 inches must be documented
- Valves
- Tees
- Mechanical Fittings, including repair clamps
- Bell Joints
- Fusions
- Test Stations, including boxes for tracer wire
- Tie-ins
- End points
- Cut-off locations
- Welds
- Any existing exposed facilities
- Protection (Plates, Each end of Casings...)

Services:

- All points mentioned above
- At least three points required for new/relay services
 - Service tees
 - Service riser or Point of Entry (POE)
 - Point between service tee and POE
 - Multiple points should be taken for longer services
- Service stubs



Gathering Data Points with Trimble Device

1. Power on device and select **GNSS Application Launcher**. A sky plot map will populate. Allow time to connect to 5 or more satellites (the top of screen for # of satellites). You may need to check your settings (on the back of this sheet) or walk to another location if you are having trouble connecting to satellites.
2. Click on **Status** and select **Data** in the top left drop down menu to create a new data file. This will bring up a screen similar to Fig. 1.
3. Add the WOF# in the File Name with a dash or space, before the R number that is automatically generated. Select a data dictionary name, either Liberty Utilities or Contractor. Click **Create** and confirm Antenna Height (Height: 6.621ft, Type: Zephyr - Model 2, Measure To: Bottom of antenna mount) and Click OK.
4. Click **Options** and select **Repeat**. This will save the information you entered from a previous point.
5. Select the feature that will be captured. Choices should look similar to Fig. 2. Select a feature and click **Create** at the bottom of the screen. See below for GPS Data Collection Requirements.
6. Fill out the data entry fields. Fig. 3 and 4 shows an example of data entry screen. As the data entry fields are being completed, the device is collecting GPS points. The bull's eye in the top-right of the screen will begin to count. The underlined features are required fields. Complete the necessary data fields and allow at least 30 seconds to pass while doing so. Click **Done**. Please note: service valves should be collected under "Valves".
7. Follow steps 5 and 6 if additional GPS points are needed under the W/O. Once completed close the file by clicking **Close** and **Yes**.
8. Once closed, this will bring you back to the "Create New File" screen. Repeat steps 3 to 6 to create a new file and collect GPS points. If not, click **Data** and **Exit** to exit out of program. Shut down device if not using.

IMPORTANT: A SEPARATE FILE WILL NEED TO BE CREATED FOR EACH WORK ORDER AND/OR A START TO A NEW DAY.

9. Turn off device and charge each day. Do not allow battery to completely diminish.

GPS DATA POINTS MUST BE DOWNLOADED BY YOUR SUPERVISOR WEEKLY

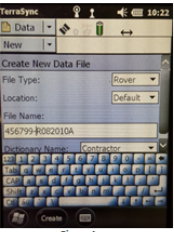


Figure 1.

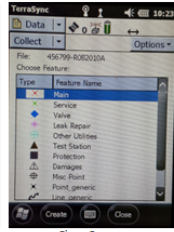


Figure 2.

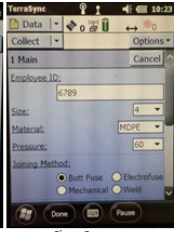


Figure 3.

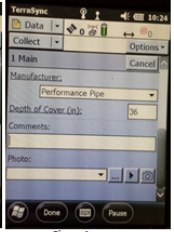


Figure 4.

GPS Data Collection Requirements

Mains:



- Every joint/fuse or 40 feet along the main
- Any point where there is a change of direction (Elbows)
- Exposed or new crossings of other utility, municipal or other underground facilities
 - Clearance less than a 12 inches must be documented
- Valves
- Tees
- Mechanical Fittings, including repair clamps
- Bell joints
- Fusions
- Test Stations, including boxes for tracer wire
- Tie-ins
- End points
- Cut-off locations
- Insertions
- Welds

Services:

- Blow-offs
- Any existing exposed facilities
- Protection (Plates, Each end of Casings...)
- All points mentioned under main
- At least three points required for new/relay services
 - Service tees
 - Service riser or Point of Entry (POE)
 - Point between service tee and POE
 - Multiple points should be taken for longer services
- Service stubs

Any trouble please call Bill Treadwell 207-319-4809 from MTS or Ian Crabtree 603-327-9057.

GPS Data Collection

 **Data** | ▾ 

New (I) | ▾



Create New Data File

File Type: ▾

Location: ▾

File Name:













Dictionary Name: ▾

 **Data** | ▾ 



Collect | ▾ **Options** ▾

File:

Choose Feature:

Type	Feature Name
	Main
	Service
	Valve
	Leak Repair
	Utility Crossing
	Test Station
	Protection
	Damages
	BS Cutout
	Misc Point
	Point_generic
	Line_generic

GPS Data Collection

 Data | ▾ 

Collect | ▾ Options ▾ Log ▶

1 Main OK

Employee ID:

Size: ▾



Material: ▾

Pressure: ▾

Joining Method:

Butt Fuse Electrofuse
 Mechanical Weld

Description: ▾

 Data | ▾ 

Collect | ▾ Options ▾ Log ▶


1 Main OK

Manufacturer: ▾

Depth of Cover (in):

Comments:

Photo: ▾



Pathfinder Office

The screenshot displays the Pathfinder Office interface with three main panels:

- Map 1:264, <- 163 ft ->**: Shows a map with several points marked with 'x' and one diamond. A point on the left is highlighted with a blue square.
- Time Line**: Shows a timeline from 11:00 to 11:06. The highlighted point from the map is shown as a blue square on the timeline at approximately 11:00:30.
- Feature Properties**: Shows the attributes for the selected point feature. The table below is highlighted with a red box.
- Position Properties**: Shows the spatial coordinates and precision for the selected point. The North, East, and Horiz. Precision values are highlighted with red boxes.

Attribute Name	Value
Employee ID	651
Size	6
Material	MDPE
Pressure	LP
Joining Method	Mechanical
Description	Coupling
Other Description	
Manufacturer	Dresser
Other Manufacturer	
Depth of Cover (in)	36
Comments	
Photo	

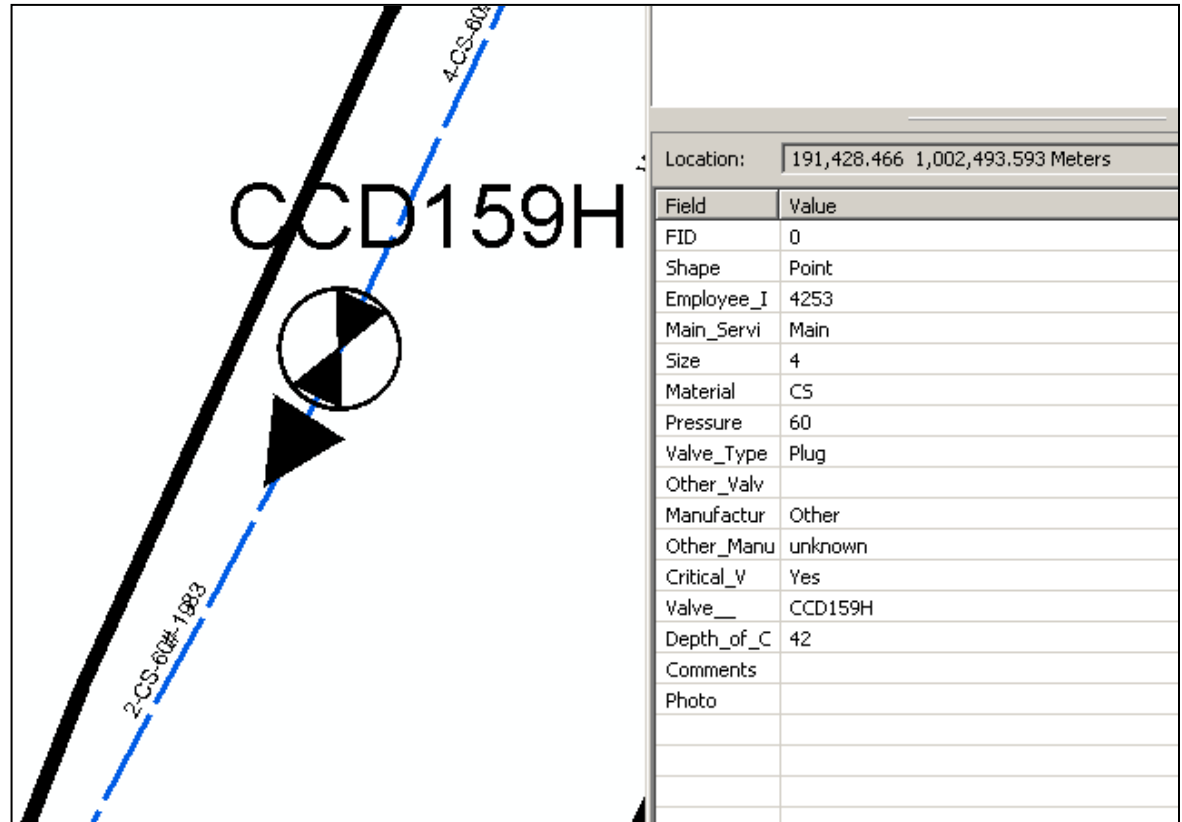
Property	Value
North:	94516.546 ft
East:	1040524.725 ft
Altitude (MSL):	126.886 ft
Date:	11/13/2013
Time:	10:59:47.000 am
Vertex:	
Position:	Average of 56
Horiz. Precision:	3.2 in
Status:	L1/L2 Postprocessed Carrier Float
Filename:	912226R.111310A.cor

GPS – GIS Integration

Primary Valve - Concord, NH

GPS data points collected for Primary Valves.

Primary Valves inspected annually in accordance with Federal and State Regulations in order to safely operate the distribution system.



GPS – GIS Integration

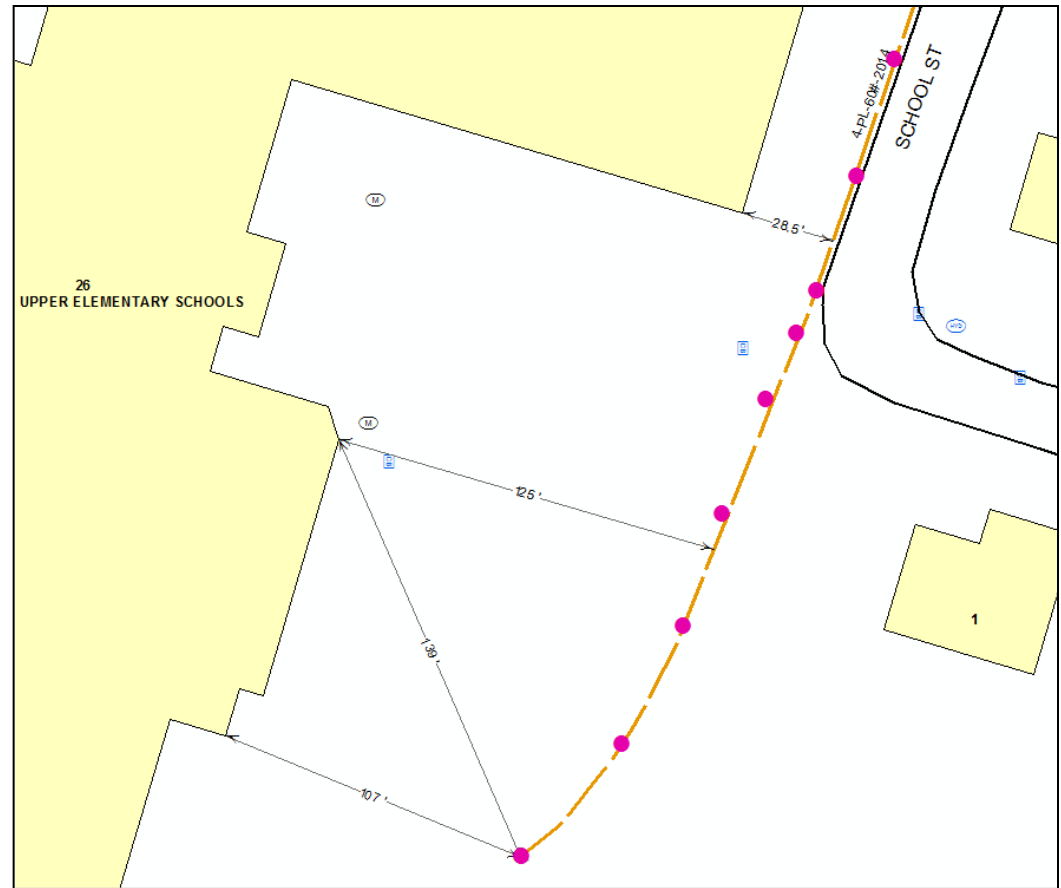
School St, Merrimack NH,

Install 983 ft. of 4" PL main.

GPS points collected along main during main installation.

Dimensions to main taken from existing building. Building existed in GIS.

GPS data points collected align well along length of main. GPS Points and main location taken from buildings do not align perfectly at end of main – probably due to inaccuracy of building location in GIS.



GPS – GIS Integration

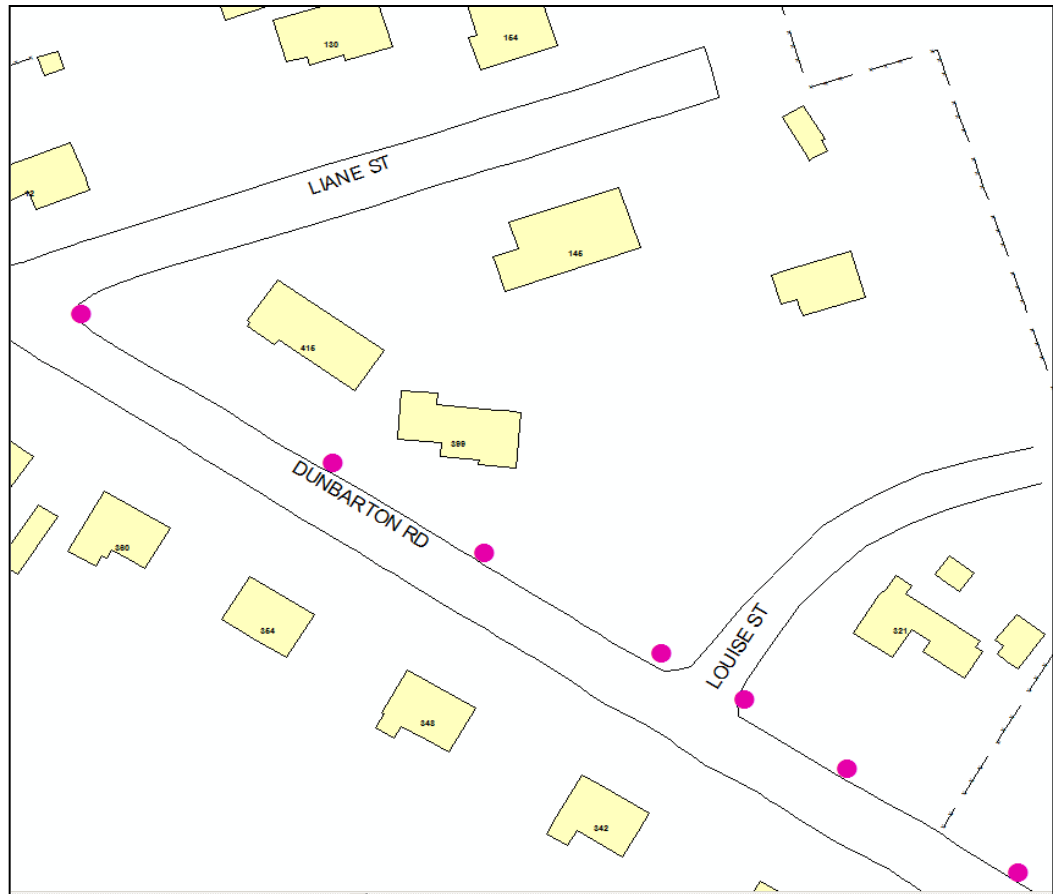
Dunbarton Rd, Manchester NH

Install 6400 ft. of 6" PL main.

Main was installed prior to the implementation of GPS data collection.

Dimensions to main taken from 55 existing poles on road. Poles did not exist in GIS.

Use GPS to locate 55 poles to support mapping of new gas main.



GPS – GIS Integration

South River Rd, Bedford NH

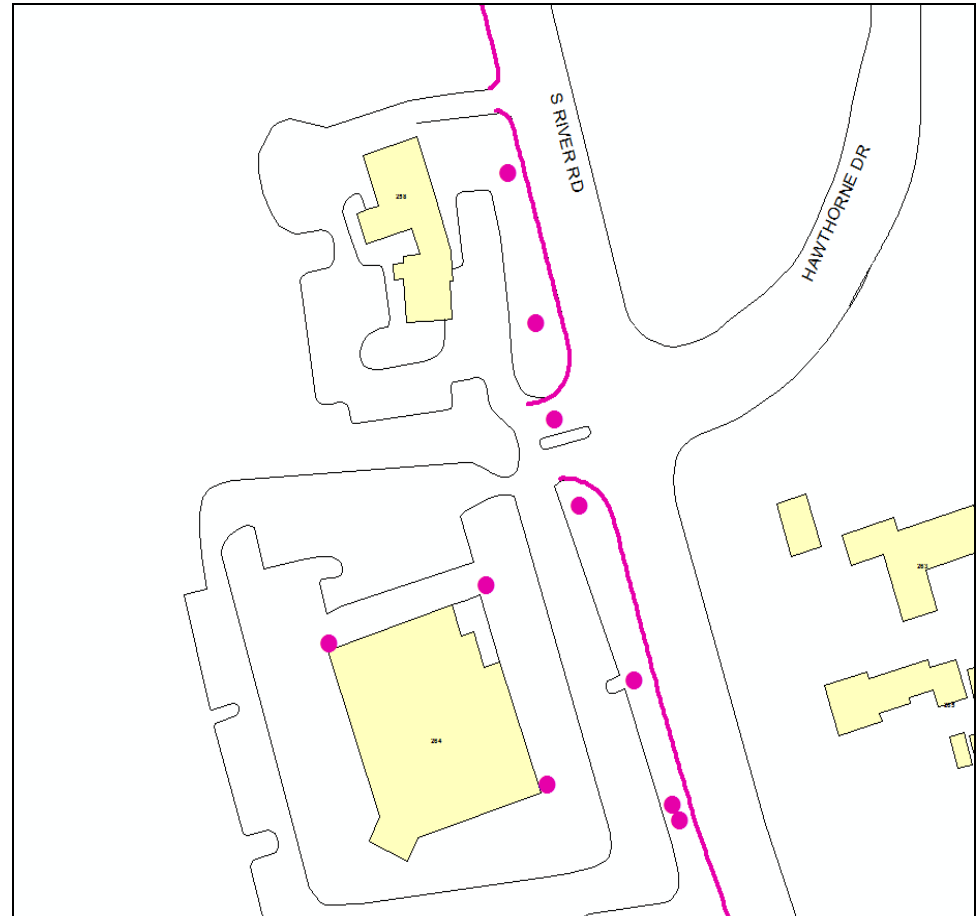
Relay 980 ft. of 4" PL main.

Main relay performed in conjunction with street widening.

Main was installed prior to the implementation of GPS data collection.

Dimensions to main taken from new relocated poles on road.

Use GPS to locate new poles and new curb lines to support mapping of relay gas main.



Challenges/Obstacles

- Time consuming to manage – collect files, correct files, create shp files and integrate into GIS.
 - Further investigate Real-Time Data Correction
 - Work with field personnel on naming convention and training – 18 contractor crews and 10 in-house crews in a large territory.
 - Expecting increase in workload – requires more GPS units
 - System Improvements
 - Updates need to be loaded into each individual unit
 - Data Dictionary Improvement
 - Feedback from the field
 - Changing settings
-

Future Initiatives - Barcoding

ASTM F2897-14 - Standard Specification for Tracking and Traceability of Natural Gas Distribution Components

Character Number	Source	Description of Information	Character	Information
1	www.compnentid.org	Name of component manufacturer	X	Corresponds to list on www.compnentid.org
2			X	
3	Component Manufacture's lot code	Information which can help ascertain relevant traceability information upon request	5	Corresponds to the mfg lot number 1234000
4			b	
5			1	
6			e	
7	Component production date code per 5.3	Date of manufacture of given component	2	Corresponds to production date of 11010, that is, 110th day of 2010
8			R	
9			A	
10	Component material type per Table	Material used for component	B	PE2708
11	Component Type per Table 4	Component type	1	Pipe - Coiled
12			2	
13	Component size per 5.6	Component size	3	Corresponds to size code of 14024 for 1-1/2 inch IPS 0.090" wall pipe
14			y	
15			5	
16	www.compnentid.org	Reserved for future use	0	Default value

Future Initiatives - Barcoding



Code 128 Bar Code



2D Data Matrix – Aztec Format

FIG. X2.1 Code 128 Bar Code and 2D Data Matrix – Aztec Format



Recap

- GPS Selection
- GPS Data Collection Requirements
- GPS Process
- Integration into GIS
- Challenges/Obstacles
- Future Initiatives - Barcoding
- Questions