



# Implementing A Digital Inspection Program

2019 Fall Operations Conference  
October 17, 2019

Tract D – Quality Management



**Norwich  
Public Utilities**



# Introductions:



- David Poore – GIS Manager
- Norwich Public Utilities (NPU) provides four utilities to the City of Norwich, CT
  - Natural gas
  - Electricity
  - Water
  - Wastewater collection



- Ed White – Chairman/CEO
- RTP Based technology company, founded in 2002
  - Patented technology
  - Software products and services focused on collecting and sending information from the field
- Experience with NGA members
  - Works with a number of NGA members and contractors to eliminate paper in key processes such as DIGSAFE, EAM, Construction, Safety, Time / Materials Management, QA-QC

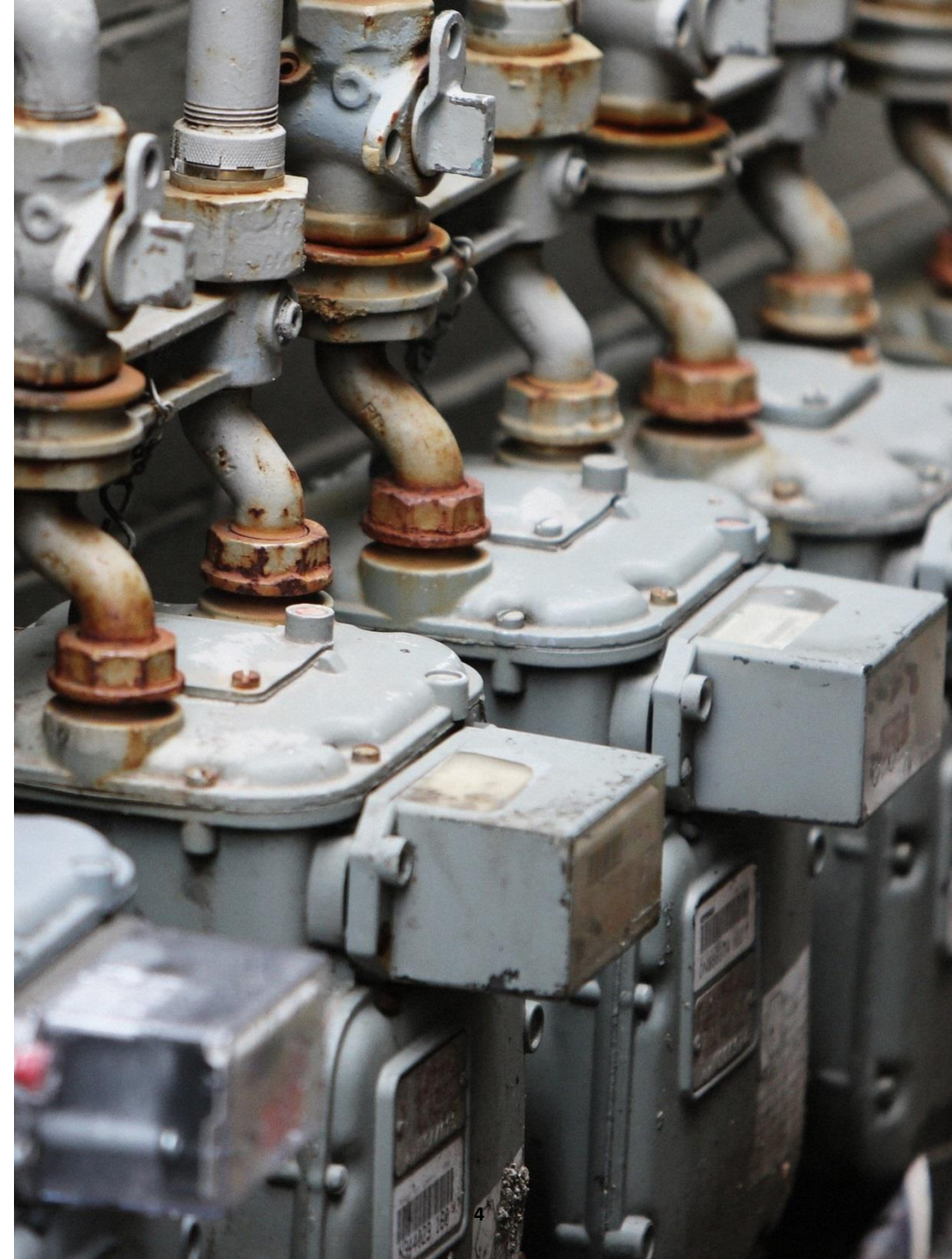
# Objectives of NGA

- Standardize construction / operation procedures for LDCs
- Standardize / improve training
- Standardize forms to capture data that can be used to determine failure trends and perform root cause analysis of failures
- Improve accuracy of inspections with full validation of data when captured
- Reduce costs
- Provide a SINGLE platform for all contractors to use when performing compliance inspections
- Build to support PHMSA Standards



# Inspection Challenges

- Increased regulatory pressure at state/federal level.
- Inconsistent data capture approach impedes analytics, potentially increases risk.
- Multiple independent contractors, each working for multiple utilities.
- Inconsistent training reduces data quality.
- Incomplete or inaccurate asset data.



# Issues / challenges to deploy multi-utility solution

## Sharing of Data Between Utilities

- No customer or premise data to be shared
- Data to be shared would be limited to material / processes

## Security

- Integrity of mobile technology solution
- Cloud based hosting

## Some level of mobile technology deployment by most member utilities

- Leverage existing mobile technology
- Complement software already in use

## Standardization of data model

- Common formats
- Mapping where required





# SOLVING THE FIELD DATA COLLECTION PROBLEM

# The Solution

- Asset and Information Sharing Service that:
- Extracts and delivers inspection forms to and from the field.
- Provides all required business rule validations.
- Enables workflow and approvals.
- Provides inspection analysis.
- Provides updated forms based on regulatory changes.
- Provides long-term storage of inspection data for analysis for on-going improvement.
- Provides long-term vault of the inspection forms to meet regulatory requirements.
- Provides asset and inspection performance.



# The Benefits

## Collection of the Right Data:

- Intuitive user interface guides the collection of critical data (paper eliminated).
- Common form based on industry established standards used across member companies.

## Enhanced Data Quality and Content:

- Data captured at the point of work performance.
- Capture images, video, audio notes and GPS coordinates.
- Comprehensive approvals process.
- Creation and/or augmentation of asset record.
- As-installed asset condition associated to specific assets and asset classes.

## Integrated Unstructured Data (e.g. Sketches)

## Resilient Solution that works on or off-line

## Data Analysis Capabilities Enable Work Performance Benchmarking

## Service fees include upgrades to support new regulatory requirements





# What does it look like? Digital vs Paper

**conEdison FIELD2BASE Inspection Form**  
Right Data. Right Now.

**Work Order Info**

Technician Name: **Freddy Baez** Peer Badge Scan

GPS Location: **35.84177, 78.84989** Borough: **Borough** Manhattan **Weather** **GO**

Location Description: **Corner of Jones Ave and Smith St**

**Fuse Info**

Fuse Tag: **df458hg**

Date Joined: **7/14/2015**

Joint Type: **Electrofusion**

Joint Subtype: **Tapping Tee**

Machine: **Coupling**

Iron: **Tapping Tee**

Facer: **Spa Saddle**

Outlet Size: **Spa Saddle**

**Technician Note** Repair Patch

Fuse shows signs of corrosion. Will need to be replaced.

Signature: *[Handwritten Signature]*

**SEND**

**field2base** 400/51331

Shop: **Yungy** SAP CWO #: **63397228** Com Res:  M/L Prs:  LP  MP  IP  HP

Address: **1934 Built Oaks Ct. Austin Texas** Mainline #: \_\_\_\_\_

Main to Curb:  New  Replace  Retie  Cut/Abdn  Repair

Size: **1/2** Material: **Steel**  Coated  Plastic  MD  HD  Insert  Buried  Bored

Service Tee: **Rushing** Manufacturer: **SKINNER** Model: **UNKNOWN** Date: **4/5/14**

EFV Installed:  Yes  No Model #: **FLP 700** (cfn) Manufacturer: **ELSTER**

L P Service  Wet Gas System  Interfere with Normal Operation  Multiple Account  Operate Below 10 PSIG  Farm Tap  Commercial Account  Other

Curb to Meter:  New  Replace  Retie  Cut/Abdn  Repair

Insert  Buried  Bored Size:  3/2"  1"  1 1/4"  2" Material: **Steel**  Coated  Plastic  MD  HD Other: \_\_\_\_\_

Date: **6/15/16**

Regulator Inst.  Yes  No Manufacturer: **AMERICAN** Model #: **183C**

Performed Pressure Test:  Yes  No Performed CGI:  Yes  No

Testing of Main to Curb				Testing of Curb to Meter					
Date	Pressure	Minutes	Soap Test	CGI	Date	Pressure	Minutes	Soap Test	CGI
6/15/16	90	15	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes	6/15/16	90	15	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes

Type Riser Installed: **ELSTER** Design:  Factory  Field Size: **1/2**

**Meter Information**

Multi-Meter Manifold:  Yes  No How Many?: **3** Meter Location:  Front Inside  Back Inside  Left Inside  Right Inside  Back Outside  Front Outside  Left Outside  Right Outside  Field Area  By Drive

Meter Moved Outside:  Yes  No  Front Outside  Left Outside  Right Outside  Field Area  By Drive

**Visual Inspection Information for Exposed Pipe**

Pipeline Exposed	Yes	Fl.	No	Main to Curb Exposed	Yes	No	Replaced	Curb to Meter Exposed	Yes	No	Replaced
1. Steel Bare	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Steel Coated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Plastic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Cast Iron	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Fiberglass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Copper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Wright Iron	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. X-tube Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If coating is deteriorated - Did you repair?  Yes  No Additional repairs/replacement required?  Yes  No

If internal corrosion, did you find in adjacent pipe?  Yes  No Depth of ML: **32**

Work Completed By (Dominion/Contractor Co. Name): **ASW** Person Completing Form (Print name): **Mr. Redmond** Contractor OQ# (If applicable): **9528-0P40P-95**

Data Entry By (Print name): \_\_\_\_\_ Date Data Entered: \_\_\_\_\_ Tap ID Number: \_\_\_\_\_

Form No. 721.161 (Rev. 2013)  
©2014 Dominion Resources Services, Inc.

**field2base** SERVICE LINE DATA SHEET ID: 1013 Version 2.6

Shop: **SHOPGD-DEO-NORT** SAP CWO #: **1234** Com Res:  M/L Prs:  LP  MP  IP  HP

Address: **8320 Society PL** City: **Raleigh** Mainline #: **1244**

Main to Curb:  New  Replace  Retie  Cut/Abdn  Repair

Size: **1-1/4"** Material: **Steel**  Coated  Plastic  MD  HD  Insert  Buried  Bored

Service Tee: **Continental** Manufacturer: **Mech HVPT** Model: **2/16/2019** Date: **2/16/2019**

EFV Installed:  Yes  No Model #: **M-1234** (cfn) 1800 Manufacturer: **Elster**

Operates < 10 PSIG (LP Service)  HITEMP EFV Not Available (STM LNS)  Interfere w/Normal Ops or Liquid  Contaminates in Gas (Dirt)  Multi-Family/Small Comm > 1,000 SCFH

Curb to Meter:  New  Replace  Retie  Cut/Abdn  Repair

Insert  Buried  Bored Size:  1/2"  1"  1 1/4"  2" Material: **Steel**  Coated  Plastic  MD  HD Other: **Unknown**

Date: **2/16/2019**

Regulator Installed:  Yes  No Manufacturer: **American Meter** Model #: **M1234**

Wall Head Adapter Installed:  Yes  No Manufacturer: **Rockwell** Size: **4 inch**

Performed Pressure Test:  Yes  No Performed CGI:  Yes  No

Testing of Main Curb				Testing of Curb to Meter					
Date	Pressure	Minutes	Soap Test	CGI	Date	Pressure	Minutes	Soap Test	CGI
11/16/18	150 psi	30 mins	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes	12/16/18	90 psi	20 mins	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes

Tracer Wire Installed:  Yes  No Continuity Confirmed:  Yes  No Tracer Wire Installed:  Yes  No Continuity Confirmed:  Yes  No

Type Riser Installed: **American Meter** Design:  Factory  Field Size: **1-1/4"**

**Meter Information**

Multi-Meter Manifold:  Yes  No How Many?: **3** Meter Location:  Front Inside  Back Inside  Left Inside  Right Inside  Back Outside  Front Outside  Left Outside  Right Outside  Field Area  By Drive

Meter Moved Outside:  Yes  No  Front Outside  Left Outside  Right Outside  Field Area  By Drive

**Visual Inspection Information for Exposed Pipe**

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3. Plastic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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6. Copper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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8. X-tube Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If Coating is deteriorated - Did you repair?  Yes  No If internal corrosion, did you find in adjacent pipe?  Yes  No

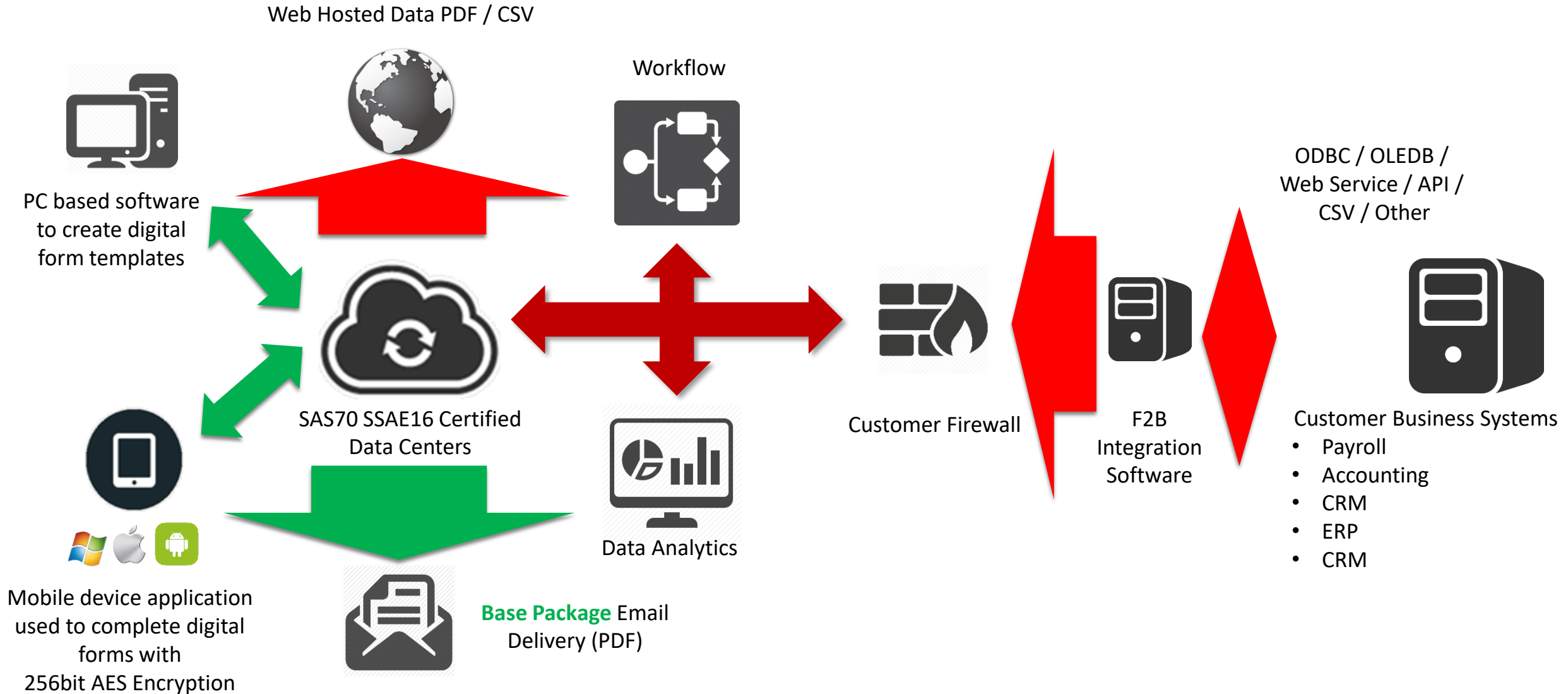
Depth of ML: **12 Ft**

Work Completed By (Dominion/Contractor Co. Name): **A.S.W. Pipeline** Person Completing Form (Print name): **Gabriel Acord** Contractor OQ# (If applicable): **Q1234**

Data Entry By (Print name): **Ed White** Date Data Entered: **2/17/2019** Tap ID Number: **12345**

Form No. 721.161 (August 2018)  
(Formerly D2277)  
(c) 2018 Dominion Energy

# How do we do it? The technology architecture



# Hardware considerations

- **Tablet Computers and Smart Phones**
  - Form size / complexity may dictate hardware
- **Operating Systems**
  - Windows, Android, iOS
- **Environmental Considerations**
  - Weather (Rain, temperature)
  - Direct sunlight (outdoor use)
  - Intrinsically safe
- **Connectivity**
  - Digital Cellular (i.e. Verizon Wireless)
  - Wi-Fi





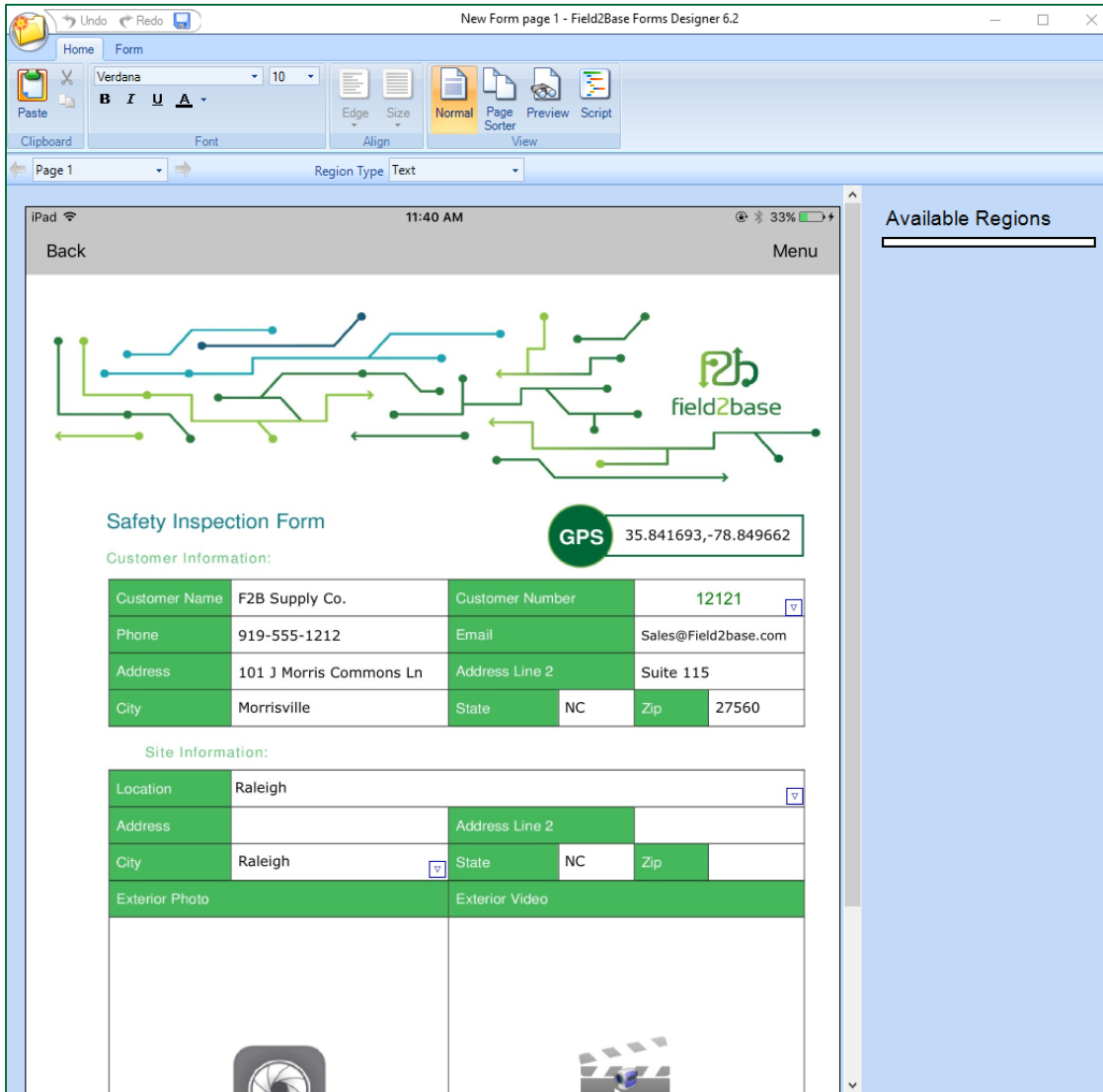
# Implementation doesn't have to be complicated

STEP 1	STEP 2	STEP 3	STEP 4 (optional)
Easily create customized digital form templates including advanced business logic with our forms designer software.	Complete blank forms / dispatched work orders to the field and capture enhanced media such as GPS, barcodes, signatures, calculations, photos, and much more.	Get your data back as an email (PDF) or have Field2base host the data for you in a secure web based portal.	Integrate the form with your current business systems using ODBC/OLEDB, API WebService, CSV or XML format.





# Forms Designer



- Easy-to-use desktop application
- Create & maintain an unlimited number of forms
- Use **existing** paper forms as the digital form background **F2B**
- Incorporate digital media such as photos, videos, GPS, barcodes
- Use JavaScript to create business rules and workflows to ensure form accuracy

**F2B** Competitive Differentiator





# Mobile Forms™

- Android, Apple, and Windows compatible
- Complete forms, save drafts, respond to dispatched work orders, or access archived forms
- Supports dispatching with turn-by-turn directions
- On-site credit card processing for customers
- Prevent issues by capturing photos, videos, GPS, barcodes, and signatures in the field
- Submitted forms are delivered via email with a PDF attachment







# Online Documents

- Store completed forms in our secure SAS70, SSAE16 certified data centers
- 256bit AES encryption
- Accessible via PC or Mobile device browsers
- Ensures customer records are available at any time, anywhere
- Forms are stored in two primary ways: PDF and CSV

field2base

Home | Workflow | **Online Docs** | Analytics | Admin | Downloads

Home / Online Docs / Sent Forms

### Sent Forms

Current Filters: Date Sent - Start Date = 10/4/2017 ✕ | Date Sent - End Date = 11/3/2017 ✕ | Display Final Sent Form Version Only (applies to Workflow only) = checked ✕

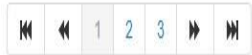
Ref Num	Form Name	Sender	Date Sent
30767	Field2Base Sample Form v4.1	jesseb	10/27/2017 10:53:40 AM
30759	Field2Base Sample Form v4.1	Anonymous	10/20/2017 9:33:40 AM



# Workflow



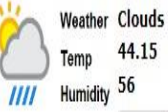
## Development Purging Record - calgary Monitor# 11/17/2017



ACME Construction

DEVELOPMENT/PURGING RECORD Ver. 11

PROJECT NAME: calgary



Weather Clouds

Temp 44.15

Humidity 56

Get Weather

PROJECT NO: 123

MONITOR NO.: 123745

DATE: 11/17/2017

(A) TOTAL MONITOR LENGTH (m):	45		
(B) MONITOR PIPE INTERNAL DIAMETER (mm):	12		
VOLUME (L) = 0.000785 (B) <sup>2</sup> x ((A)-(C))			
DATE/TIME dd/mm/yy	12/8/2017 12:52 PM		
(C) WATER LEVEL BELOW TOP OF MONITOR (L)	54		
CALCULATED VOLUME IN MONITOR (L)	-1.02		

Recipients History Validation Log Actions

### Actions

Re-assign workflow from MatthewL user to:

Assign Workflow ▾

Action ▾

Approve

Send Back to Tablet

Delete

- Allows managers and decision-makers to review, edit and approve data before it's delivered to the final destination
- Data can be further modified based on predetermined rules defined by the customer





## Enterprise Integration

Our integration solutions allow our large customers the flexibility to map and populate form data fields automatically with existing applications using the following formats: SQL, API & Web services plug-ins, and file exports (CSV, PDF).



## Small Business Integration

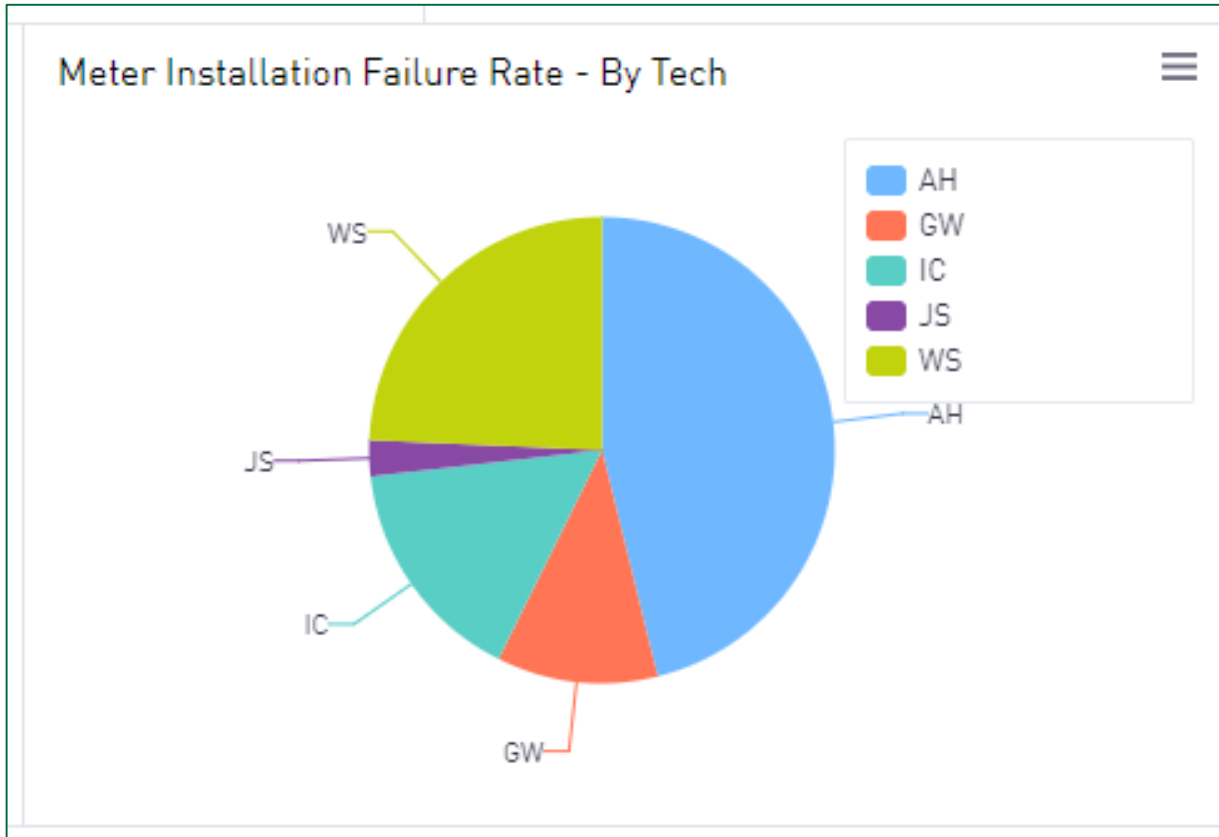
Don't have an IT department? We get it. Field2Base offers the ability to integrate bi-directionally with small and medium-sized business applications as well using CSV files.







# Data Analytics



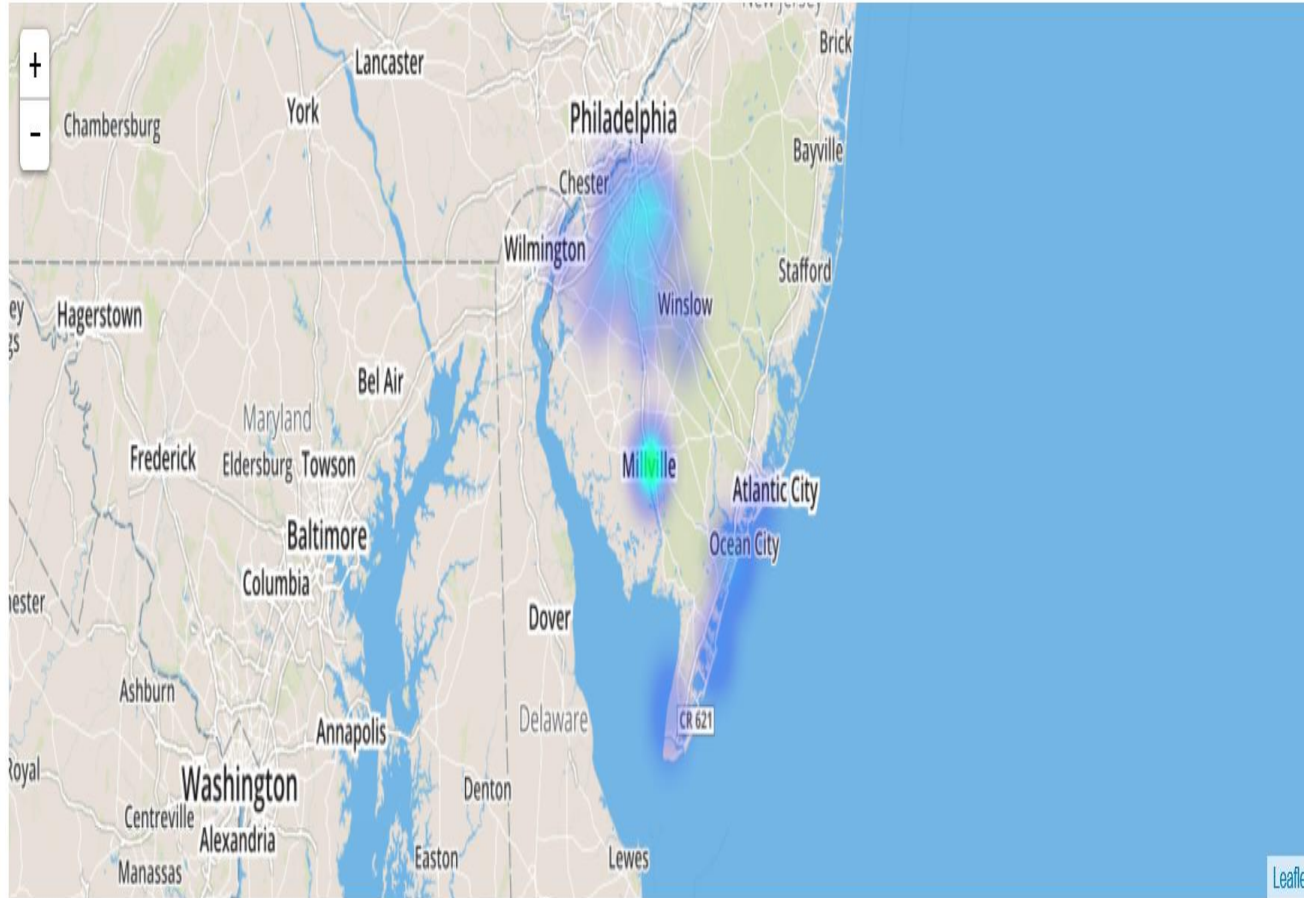
- Lets users access dynamic, real-time data to gain insights and create customized reports **F2B**
- Reports may include pivot tables, pie charts, line graphs, heat maps (via GPS), and bar charts
- All reports are accessible online from any authorized user or device

**F2B** Competitive Differentiator



# Data Analytics

Unsatisfactory P&S Audits



- Field2Base Data Analytics provides you with powerful tools to gain insight and report on your digital form data.
- Reports can include pivot tables, pie charts, line graphs, heat maps (based on the GPS locations of where the forms were completed) bar charts, interactive charts and much more.
- All reports are online and accessible from any authorized user / device. Reports are permission based so only specific groups within your organization can view specific reports.

# Case Study: Enterprise Asset Management - Metering

8:17 AM 82%

Back Menu

**FIELD2BASE**  
RIGHT DATA, RIGHT NOW.

SCHEDULED: 09/15/2015  
APPOINTMENT: Ed White  
ASSIGNED TO: Matthew Lockridge

ADDRESS: 101 J. Morris Commons Lane  
CITY: Morrisville STATE: NC  
ZIP: 27560 COUNTRY: USA  
LATITUDE: 35.927334 LONGITUDE: -78.596176  
LOCATION: Right Side of Building

1134 EXPECTED METER # M123451134 AS FOUND METER #  
 Actual Meter Number Does Not Match Expected Number

PHOTO OF AS FOUND METER AsFound Meter # still does not match Expected Meter #. Verify **VERIFY**




WORK ORDER ID: RA1000 CYCLE: 10 ROUTE: 15 SEQ: 01 META AMI - PAGE 1

9:06 PM 36%

Back

PHOTO OF AS LEFT METER



1134 AS LEFT METER #	8825 RADIO ID	2S METER FORM	35010 AS LEFT kWh
3510 AS LEFT kW	 AS LEFT kVARh	2400 AS LEFT MULT.	1134 CONFIRM AS LEFT METER #

ADDITIONAL NOTES Repaired Socket

COMMENTS  
Socket was damaged in area of the meter seal

META AMI - PAGE 5

## Vertical: Utilities

**Problem:** Major utility contractor installed meters for electric utilities under service contracts using a combination of systems from meter suppliers and other systems suppliers. Major issues with data validation, reconciliation of meter inventory, and repeat trips to verify or correct meter installations.

**Field2Base Resolution:** Field2Base designed digital meter change out forms for the service company. Full integration with the utility business systems allow the forms to be prefilled with scheduled work order information each day. Any pre-existing meter data that was incorrect can now easily be corrected by the workers in the field and subsequently updated in the business systems. Java scripting was used to build out complete validation of as-found meter data and validation of meter readings. Dynamic dispatch of work orders throughout the day allows crews to do off-cycle meter readings while in proximity to the customer with the read request.

**Project Timeline:** Field2base was able to build and deploy this solution in less than 2 months.

# Case Study: Enterprise Asset Management – Gas Inspections

9:44 PM 31%

Back

**FIELD2BASE** FIELD LEAK/3<sup>RD</sup> PARTY DAMAGE FORM Right Data. Right Now. Version 1.0

DISTRICT: 1234 LEAK CASE: A1234567 PRE ADDRESS TYPE POST DIMEN DIR  
 SVC. ORDER #: SV12345678 GRADE: A STREET INFORMATION: W 1116 Silver Oaks Ct Street: 1224 1234 123  
 APO/QUAD: 1234567 LOCATE #: 12345677 CROSS STREET NAME 1: NW Kings Grant Alley: A123 ABC A13  
 DETECT TYPE: METER #: M1234567 CROSS STREET NAME 2: SW Falls of Neuse Road Lane: B123 1111 822  
 01 SURVEY  02 MISC City: Raleigh STATE: NC ZIP: 27614

DATE DISCOVERED: 3/1/2015 DATE INVESTIGATED: 3/1/2015 DATE DISPATCHED: 3/1/2015  
 TIME DISCOVERED: 8:25 AM AM / PM TIME INVESTIGATED: 10:03 AM AM / PM TIME DISPATCHED: 11:40 AM AM / PM  
 LEAK REPORTED TO: Piedmont Natural Gas PHONE:  
 LEAK REPORTED BY: Ed White PHONE:

COMMENTS: First noticed the smell of gas at the meter near the lower garage. It appears to be a leak in the coupling at the meter.

---

SYSTEM (04 Meter) CUSTOMER TYPE SURFACE CONDITION % GAS: (Highest Sustained Reading) 10  
 01 Transmission  00 R Residential  01 Dirt/Grass CGI#: C123456789 Initials: SEW  
 02 Distribution  01 C Commercial  02 Gravel ADDITIONAL PIPE INFO: Steel pipe to meter  
 03 Service  02 I Industrial  03 Asphalt YEAR MAIN OR SERVICE INSTALLED: 1994  
 04 Meter  04 F Federal Property  04 Sidewalk/Curbing PIPE SIZE/TYP: Copper, 4 inch  
 05 Outer Facility  05 M Mixed Use  05 Concrete PRESSURE: 300 psi  
 06 P PNG Property  06 Landscape

PIPE CONDITION: COMPONENT (1) MATERIAL COMPOSITION (1)  
 01 Poor  01 Main - Distribution  23 Clamp  002 PLB Orifice  007 COP Copper  
 02 Fair  02 Main - Transmission  24 Tie  003 PLC Flange  008 Ductile Iron  
 03 Good  06 Valve  25 Tee Valve (Service Tee)  004 STC Steel Coated  010 SR Steel & Plastic  
 09 Regulator  26 Reducing Coupling  005 BS Bare Steel  011 SCC Steel Concrete Coated  
 10 Farm Tap  27 Insulator  006 CI Cast Iron  013 PLM Medium Density Plastic  
 16 Riser  42 SPV  001 Aluminum  015 MRLex TR212  
 17 Service  46 Station  022 ALPLA  016 PVC  
 19 Main - Exposed (Identify Specific Components In Comments)  
 21 Line Stopper  57 Mech Fitting  
 58 Meter  59 Meter Bulldup

LEAK CAUSE (Most Significant) REPAIR CODES (Up to 4)  
 01 Corr (Underground)  07 Hal. Causes  24 Greased Existing Component  39 Tightened Exist Component  
 02 Corr (Ground Line)  10 Excav (PNG, Inst Contractors)  36 Replaced Steel with Steel  40 Replaced Exist Component  
 03 Corr (Above Ground)  11 Other Outside Force Damage  29 Replaced Steel w/Plastic  69 Replaced Existing Component  
 04 Excav (3rd party)  12 Equip. Failure (Parts, Fittings etc)  30 Replaced Plas. w/Plas. (Mech Coupl)  43 Killed Service  
 06 Mat. Failure (Pipe Only)  13 Oper. Errors  31 Replaced Plas. w/Plas. (Butt Fuse)  48 Killed Service Stub  
 08 Other (Bad connection to meter)  38 Replaced Plas. w/Plas. (Electrofuse)  42 Killed Main Section  
 32 Closed Positive (Gas Not Natural)  28 Install Leak Clamp  49 Welded Component  
 34 Closed Positive (New Leak Case)  49 Welded Component  
 47 Close Positive (Duplicate)  53 Returned to Serv. not Dist. Leak  
 52 Determined No Leak  56 Made Safe/Customer Line Leak

CP INFO (complete if applicable)  
 PIPE TO SOIL VOLTAGE 12  
 CP# # A123456789999  
 LATE INSTALLED: 3/1/1998 DOT Reportable  Yes  No

LEAK RECHECK DATA				RESPONDING EMPLOYEE INFORMATION			
DATE	POS READING Yes / No	GRADE	EMPLOYEE ID	DATE	Employee ID#	Hours On Scene	Truck Number
3/1/15	Yes	A	123456778	3/1/15	112334465	3.50	T12345666

REPAIR INFORMATION  
 ACTUAL MAN HOURS: 5.25  
 ACTUAL EQUIPMENT HOURS: 4.50  
 Material Used for Repair (Quantity) Catalog Number  
 2 P1000  
 4 P2000  
 DATE 3/1/2015  
 SIGNATURE Ed White

SendForm Add Photos Next Page

9:45 PM 31%

Back

**FIELD2BASE** Field Leak / 3<sup>rd</sup> Party Damage Form Right Data. Right Now.

SVC. Order SV12345678 Address 1116 Silver Oaks Ct  
 GPS Coordinates 35.927286,-78.596163 Date/Time 3/2/2015 2:00 PM

Photo One Photo Two  
 Photo Three Video One  
 Primary Contact Business Card Secondary Contact Business Card

First Page

## Vertical: Utilities

**Problem:** Major utility has to inspect all claims for damage from gas pipeline leaks due to third party activity such as construction, installation of underground cable, fiber, etc.

**Field2Base Resolution:** Field2Base designed digital inspection forms for the utility based on forms that were already in use by the utility. Addition of GPS Coordinates, photos, video, and time/date stamps can now be used to provide a total picture of what happened with validation of time and location.

**Project Timeline:** Field2base was able to build and deploy this solution in less than 1 month.



# Case Study: Enterprise Asset Management – Power Plant Inspections

8:25 AM 99%

Back

**FIELD2BASE**  
Right Data. Right Now.  
Version 1.0

LNG PLANT - EQUIPMENT LOG 1

DATE: 3/17/2015 8:50 AM  
OPERATOR: Martinez

ITEM	SHIFT: 11-7
SWGR. BLDG.	
BLDG. TEMP	60
BATTERY DC AMPS	1.7
DC VOLTS	135
BLDG. CLEAR	OK
CCW ITEM SYSTEM	1/2 1
EXPANSION TANK LEVEL PUMP IN SVC	1
MAIN SYSTEM SELECTOR NO.	84 78
SUCT/DISCH TEMP	7.8 49
SUCT/DISCH PRESSURE	A A
PUMP 1 H-O-A/PUMP 2 H-O-A	A A
MOD 1 FANS H-O-A/MOD 2 FANS H-O-A	Low
MOD 1 FAN 1A OFF-LO-HIGH	Standby
FAN 1B OFF-LO-HIGH	Standby
MOD 2 FAN 2A OFF-LO-HIGH	Standby
FAN 2B OFF-LO-HIGH	OK
FIN FAN SUMP INSPECTION	
C3 IN SERVICE A-B-C	A 1/S B S/B C O/S
OIL TEMP	73 78
OIL LEVEL	OK OK
SEAL GAS PRESS	10.2 12.4
LAMP TEST	OK OK
C3 IN PRESS	15.2
OUT PRESS.	2.4
OUT TEMP.	LINE 1 2.4 LINE 2 0
P50A STATUS	Out Of Service
OIL LEVEL	OK
SEAL LEVEL	OK
ROTATE	OK
OUT LINE PRESS.	2.3
P50B STATUS	In Service
OIL LEVEL	OK
SEAL LEVEL	OK
ROTATE	OK
OUT LINE PRESS.	2
P50C STATUS	In Service
OIL LEVEL	OK
SEAL LEVEL	OK
ROTATE	OK
OUT LINE PRESS.	1.3
LNG SUCT LINE PRESS	12.2
LNG TANK	
COLD SPOT INSPECT.	OK
ANNULUS - TOP PRESS.	1.3
"METH" BOT. PRESS.	1.9
"METH" FOUND HEAT BREAKERS	On
DIKE AREA CLEAR	Yes
SHELTER AREA CLEAR	Yes

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Next Page

8:25 AM 99%

Back

**FIELD2BASE**  
Right Data. Right Now.

LNG PLANT - EQUIPMENT LOG 1

DATE: 3/17/2015 8:50 AM  
OPERATOR: Martinez

ITEM	SHIFT: 11-7
BREATHER TANK RDG.	Full
ADD N2 - TIME	Off
DRY POWDER TANK TOP	In Service
DRY POWDER LNG PUMP AREA	In Service
SERVICE WELL	
TANK WATER LEVEL	1/2
TANK PRESS.	90
LNG TANK FOUNDATION	
1 - TEMP	37
2 - TEMP	46
3 - TEMP	44
4 - TEMP	45
5 - TEMP	44
6 - TEMP	43
7 - TEMP	38
HEATER STATUS	On
POWER SUPPLY	On On
BANK 1 VOLTS	475
AMPS	175
BANK 2 VOLTS	480
AMPS	245
BANK 3 VOLTS	480
AMPS	0
SECURITY	
YARD LIGHTS ON	No
LIST LIGHTS OFF	Yes
TANK FARM	
VISUAL INSPECTION	OK
D-13 LEVEL	0
D-16 LEVEL	48.3
D-17 LEVEL	1.4
LIN TANK T-723-A	45.4
TANK FARM SUMP INSPEC.	OK
OIL STORAGE INSPECTION	
VISUAL INSPECTION	OK
WASTE OIL (GALS.)	1200
ASSISTANT	Jh
OPERATOR REVIEW	EB

First Page

## Vertical: Utilities

**Problem:** Major utility has to inspect LNG power plants each day on a three shift basis using paper forms. Missing inspection reports and delays in reporting are creating issues with regulators.

**Field2Base Resolution:** Field2Base designed digital LNG plant inspection forms for the utility. Forms can now be filled out with full validation of all data including date/time of the inspections for compliance purposes.

**Project Timeline:** Field2base was able to build and deploy this solution in less than 1 month.

# Case Study: Enterprise Asset Management – Fleet Inspections

8:55 AM 85%

Back Menu

### ANNUAL VEHICLE INSPECTION REPORT

**FIELD2BASE**  
Right Data. Right Now.

VEHICLE HISTORY RECORD  
 Fleet Unit # 1234  
 Work Order # 133467  
 DATE 9/23/2015

MOTOR CARRIER OPERATOR Field2Base, Inc. INSPECTOR'S NAME (PRINT OR TYPE) Ed White  
 ADDRESS 101 J. Morris Commons Lane  
 CITY, STATE, ZIP CODE Morrisville, NC 27560  
 VEHICLE TYPE (D TRACTOR OR TRAILER) TRUCK (S BUS (S OTHER) INSPECTION AGENCY (LOCATION (OPTIONAL) NC DOT

OK	NEEDS REPAIR	REPAIR DATE	ITEM	OK	NEEDS REPAIR	REPAIR DATE	ITEM
Y			<b>1. BRAKE SYSTEM</b>	Y			<b>6. SAFE LOADING</b>
Y			a. Service Brakes	Y			a. Parts of vehicle or condition of loading such that the spare tire or any part of the load or damage can fall onto the roadway.
Y			b. Parking Brake System	Y			b. Tires on any steering axle
Y			c. Brake Drums or Rotors	Y			c. Tires on all other tires
Y			d. Brake Hoses	Y			d. Lock or sliding ring
Y			e. Brake Tubing	Y			e. Wheels and Rims
Y			f. Low Pressure Warning Device	Y			f. Fasteners
Y			g. Tractor Protection Valve	Y			g. Weeds
Y			h. Air Compressor	Y			h. Windshield Glazing
Y			i. Electric Brakes	Y			Requirements and exceptions as stated pertaining to or vision reducing matter (reference 893.60 for exceptions)
Y			j. Hydraulic Brakes	Y			<b>13. WINDSHIELD WIPERS</b>
Y			k. Vacuum Systems	Y			a. Any power unit that has an improper wire or missing or damaged parts that render ineffective
NA			<b>2. COUPLING DEVICES</b>	Y			<b>14. SEAT BELTS</b>
NA			a. Fifth Wheels	Y			Check operation and expiration date
NA			b. Pintle Hooks	Y			<b>15. OTHER</b>
Y			c. Drawbar/Low Bar eye	Y			(List any other conditions which may prevent safe operation of this vehicle.)
Y			d. Drawbar/Low Bar Tongue	Y			
Y			e. Safety Devices	Y			
Y			f. Saddle Mounts	Y			
Y			<b>3. CHASSIS SYSTEM</b>	Y			
Y			a. Exhaust system leaking forward or directly below the driver/sleeper compartment	Y			
Y			b. Bus exhaust system leaking or discharging violation of standard.	Y			
Y			c. Exhaust system likely to burn, or damage the electrical wiring, fuel supply, or any combustible part of motor vehicle.	Y			
Y			<b>4. FUEL SYSTEM</b>	Y			
Y			a. Visible Leak	Y			
Y			b. Fuel Tank Filler cap missing	Y			
Y			c. Fuel Tank securely attached	Y			
Y			<b>5. LIGHTING DEVICES</b>	Y			
Y			All lighting devices and reflectors required by Part 393 shall be operable.	Y			

INSTRUCTIONS: MARK COLUMN ENTRIES TO VERIFY INSPECTION: Y, OK, N, NEEDS REPAIR, NA, IF ITEMS DO NOT APPLY. REPAIRED DATE

CERTIFICATION: THIS VEHICLE HAS PASSED ALL THE INSPECTION ITEMS FOR THE ANNUAL VEHICLE INSPECTION REPORT IN ACCORDANCE WITH 49CFR 393

Send\_Form

9:00 AM 84%

Back Menu

### FLEET SERVICES PREVENTIVE INSPECTION RECORD

Safety Note: Be sure you understand PPE requirements before starting work. Application: FIELD2BASE Form 07841A (R01-07) Retain 5 years (AR)

**ALTEC DIGGER DERRICK - D845 (w/ Radio Remote Controls)**

Vehicle/Equipment No: D845 w/Radio Remote Maintenance Facility: MORRISVILLE  
 Type/Model: D845 w/Radio Remote Technician: 1234 Ed White  
 Manufacturer: Altec Inspection Date: 9/23/2015  
 Hours/Miles: 55010 Schedule: 7A 1G

OK	NEEDS REPAIR	REPAIR DATE	ITEM	OK	NEEDS REPAIR	REPAIR DATE	ITEM
Y			Position truck for inspection & remove all covers.	Y			Swain boom, slow bucket, & retract 3rd stage.
Y			Conduct general visual inspection.	Y			Operate & inspect pilot circuit, cylinders & call track.
Y			Check for proper labeling.	Y			Inspect transfer pins and hoses.
Y			Check hydraulic oil level & condition.	Y			Inspect winch line, rollers, sheaves, and shackles.
Y			Inspect pedestal for cracks or fatigue.	Y			Check winch brake operation & adjust as needed.
Y			Start engine, engage PTO, verify operation of PTO light and hydraulic pump.	Y			Reverse winch line. (Note 3)
Y			Extend outriggers, inspect outrigger cylinders, pins, and locks.	Y			Retract 2nd stage, elevate to 45-60 degrees.
Y			Shut off engine, check outrigger holding valves.	Y			Activate auger release & lower auger to ground.
Y			Inspect wiring / connectors to control panels, junction box, and pilot valves.	Y			Check lubricant level in digger gear box.
Y			Check for silicone grease in all Amphenol plugs. (Note 6)	Y			Inspect condition of auger teeth, bit, & wind-up sling.
Y			Restart engine, operate all functions, from lower controls, and check for proper labeling.	Y			Inspect auger coupler fasteners & auger pin.
Y			Check E-stop operation on turret side cover.	Y			Store boom in cradle, check boom overtravel switch.
Y			Inspect rubber boots on all hand controllers, verify proper installation, operation, & for spring return to neutral.	Y			Replace return line filter & pilot line filters. (Note 5)
Y			Elevate boom to 30-45 degrees, check boom angle indicator for accuracy. Shut off engine.	Y			Swain clean entire unit.
Y			Check boom cylinder holding valves, inspect boom pins/locks, & cylinder pins/locks.	Y			Lubricate derrick completely per chart on back.
Y			Restart engine, visually inspect hydraulic lines in pedestal and boom for leaks.	Y			Inspect grounding system.
Y			Position truck for inspection of all load bearing fasteners.	Y			Check condition & availability of operators manual & cylinder pins/locks.
Y			Extend 2nd stage, inspect for damage, & inspect extension cylinder pins.	Y			Check operation of battery charger for RRC batteries.
Y			Inspect condition of boom wear pads.	Y			Charge to specific job codes:
Y			Inspect 3rd stage trunnion pins for wear & proper torque (150 ft. lbs.) through access holes in 2nd stage.	Y			Filter hyd. Oil & draw sample for analysis. (70-65-007) #
Y			Extend 3rd stage & lower to allow inspection of bearings, boom, clean, & apply silicone grease.	Y			Retorque mounting bolts: mainframe, outriggers, & rotation gear box. (Note 2) (49-65-003)
Y			Inspect bucket, mounting points, & D-ring attachment.	Y			Retorque rotation bearing mounting bolts. (Note 2) (49-65-002)
Y			Inspect bucket brake operator & condition.	Y			Perform rotation bearing deflection test, record measurement, & compare to previous measurements. (Note 7) (49-65-002)
Y			Position selector switch to upper controls, enter bucket, with safety harness, check for proper labeling.	Y			Check/adjust side load protection - both directions. (21-65-010)
Y			Using upper controls, elevate boom & check all functions, inspect for leaks or damage.	Y			Check/adjust pilot system pressure. (21-65-010)
Y			Check E-stop operation on RRC transmitter.	Y			Check/adjust outrigger boom functions system pressure. (Note 1) (21-65-010)
Y			Check 18 switch operation of RRC transmitter.	Y			Check/adjust digger/winch system relief pressure. (Note 4) (21-65-010)
Y				Y			Check/adjust hydraulic overload protection (HOP) system. (21-65-010)
Y				Y			Test upper & lower hydraulic tool circuits. (Note 8) (21-65-010)
Y				Y			Perform dielectric test. (70-65-006)
Y				Y			Perform structural stability test, if needed.

NOTES: Charge parts & labor to specific job code where given.

CODES: Y = Okay  
 X = Repaired, Adjusted, Filled, etc.  
 NA = Not Applicable  
 \* = Refer to Manufacturers Service Manual  
 # = Refer to Veh/Equip. Maint. Manual

Send Form Next Page

## Vertical: Utilities

**Problem:** Major utility has to inspect all vehicles using public roads on an annual basis. Each type of vehicle (light truck, bucket trucks, trailers, etc.) have unique inspection criteria resulting in a large array of inspection forms.

**Field2Base Resolution:** Field2Base designed digital fleet inspection forms for the utility. All data in the forms can now be validated at the time of the inspection so that incomplete forms or forms with incorrect data cannot be submitted.

**Project Timeline:** Field2base was able to build and deploy this solution in less than 1 month.

# Case Study: Enterprise Asset Management – Street Lights

## Vertical: Utilities

**Problem:** Major utility is replacing 2 million mercury vapor streetlights with LED lights. Each morning, workers were handed paper forms with “known” data for the streetlight assets such as location, fixture type, pole type, etc. Often times the information is incorrect and the worker simply scribbles over it as part of the work process. It takes weeks for work orders to get entered into business systems and project leadership had no immediate visibility into the overall project progress.

**Field2Base Resolution:** Field2Base designed digital LED streetlight change out forms for the utility. Full integration with the utility business systems allow the forms to be prefilled with scheduled work order information each day. Any pre-existing asset data that was incorrect is now easily corrected by the workers in the field and subsequently updated in the business systems. Project leadership now has real time access to overall project progress, a detailed report of inventory used, and all associated labor costs.

**Project Timeline:** Field2base was able to build and deploy this solution in less than 3 months.

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Back Menu

**FIELD2BASE**  
Right Data. Right Now.

Street Light Replacement

Seq: 10029 ID: 856 Version 1.0

**Location and Account Information**

ID	17164	Account	STREET LIGHTING	Equipment	FIRE ALARM	Date	9/21/2015
Street	AMUNDSON AVE			GPS-Latitude	35.927363		
Location	WS 1S EDENWALD AV			GPS-Longitude	-78.596109		
City	Morrisville	State	NC	Get GPS			
Zone Type	OD - Office District	Comments	Need trimming around pole				

**Expected Asset Information**

Lamp Type	MERCURY VAPOR	Pole Type		Lumens		Rated Watts	200
Utility Pole #	2022	Pole Height		Calvins		Quantity	1
Cust Pole #	1003	Arm Length		Foot Candles		ABH	4270

Is the Expected Asset Information Accurate? NO

**Actual Asset Information**

Lamp Type	MERCURY VAPOR	Pole Type	Wood	Lumens	7000	Rated Watts	200
Utility Pole #	2022	Pole Height	24	Calvins	300	Quantity	1
Cust Pole #	1003	Arm Length	8	Foot Candles	55	ABH	4270

Is Actual Asset Info Accurate? YES

**New Light Installation Information**

Model #	SSL100	Lamp Type	LED	Watts	100
Serial #	A12345	Bar Code			

Was New Installation Successful? YES

Problem Encountered No Cover on Access Panel Pole Needs Replacing

Additional Pole Equipment Antenna

Is a Follow Up Visit Required? YES

Send Form Add Photos

9:31 PM 32%

Back Menu



**FIELD2BASE**  
Right Data. Right Now.

Street Light Replacement

**Location and Account Information**

ID	17164	Account	STREET LIGHTING	Equipment	FIRE ALARM	Date	9/21/2015
Street	AMUNDSON AVE			GPS-Latitude	35.927217		
Location	WS 1S EDENWALD AV			GPS-Longitude	-78.595953		
City	Morrisville	State	NC				
Zone Type	OD - Office District	Comments	Need trimming around pole				

**Photos**

Photo One	Photo Two
	
Comments Old style light poles	Comments New lights with solar panels

First Page

# Case Study: Operations – Damage Assessment

6:40 PM 41%

Back Menu

**FIELD2BASE**  
Right Data. Right Now.

**Pole To Pole Damage Assessment Form**

Region: NORTHERN  
 Operations Center: RALEIGH  
 Construction Center: RALEIGH  
 Substation Name: LAKESTONE 115KV  
 Feeder Name: COLEY FOREST 12KV  
 Feeder Number: T4870B05

Assessment Team: White  
 Cell Phone / Pager #: 919-280-6070  
 Date: September 21, 2015

GPS Stamp: 35.927213, -78.5958  
 Time: 18:34:54

GPS Start

**Site Data**

Backbone / Tap Line: Backbone  
 Damage Location On FDR Map: 1  
 Upstream Opening Device DIS #: B-5480B04  
 Device: Breaker  
 Address of Damage / DIS #: 5100 Falls of Neuse

# Trees On Line	22	# Services Down	25
# Poles Broken	3	# Transformers Damaged	2
# Spans Primary Down, 1&2 Phase	4	# MV Sensors Damaged	1
# Spans Primary Down, 3 Phase	1	# Cap Banks Damaged	1
# Spans Secondary Down	6	# Regulators Damaged	1

**Device Data**

Primary Conductor Wire Size: #1/0 Al  
 Pole Length / Class: 30 / 7  
 Insulator Type / Voltage: Angle (HL) Clamp Top / 35kv

**Site Conditions**

Small Trees And/Or Limbs  
 High Water  
 Smart Grid Items Damaged

Comments: Damage from high winds

Photo Video

GPS Stamp: 35.927210, -78.595926  
 Time: 18:38:26  
 GPS Stop

Next Location Feeder Maps Send Form

6:40 PM 41%

Back Menu

**FIELD2BASE**  
Right Data. Right Now.

**Pole To Pole Damage Assessment Form**

Region: NORTHERN  
 Operations Center: RALEIGH  
 Construction Center: RALEIGH  
 Substation Name: LAKESTONE 115KV  
 Feeder Name: COLEY FOREST 12KV  
 Feeder Number: T4870B05  
 Backbone / Tap Line: Backbone

Assessment Team: White  
 Cell Phone / Pager #: 919-280-6070  
 Date: September 21, 2015

GPS Stamp: 35.927213, -78.5958  
 Time: 18:34:54

Stop Assessment: 35.927210, -78.595918:38:26

Feeder Map 1 Map 130

Next Map Back T...Location First Location

## Vertical: Utilities

**Problem:** Major utility has developed a very well defined process for damage assessment and restoration coordination for major events such as hurricanes. The process was to have crews visit an operation center, pick up geographical and feeder maps, then drive to a designated area to start the assessment process. After paper forms are filled out for the feeder and maps have been annotated using color markers, the assessment crew drives back to the operations center and faxes the information to the operations center.

**Field2Base Resolution:** Field2Base designed digital Damage Assessment forms for the utility with GPS validation of assessment areas, capture of photos and video, annotation of feeder maps, etc. so that a complete assessment of the site damage can be captured and uploaded wirelessly to central response centers.

**Project Timeline:** Field2base was able to build and deploy this solution in less than 3 months.





- David Poore – GIS Manager
- Norwich Public Utilities (NPU) provides four utilities to the City of Norwich, CT
  - Natural gas
  - Electricity
  - Water
  - Wastewater collection

# Digital Inspection Transition

## Drivers

- Reinforce Quality Assurance Program
  - Started using Contracted inspectors
- Improve internal and external (regulators) inspection review
- Increase oversight and accountability
- Easier documentation retrieval
- Tracking\traceability
- [Pipeline Safety!](#)

## Solution Requirements

- [Easy to use!](#)
- Cross-platform
- Cost effective
- In-house form development
- Easy to administrate
- Onsite data storage

**Field2Base and ESRI Collector solutions for our inspection needs**

# Field2Base Deployment Strategy

## Phase 1: Form Development

- Three inspections targeted
  - Daily Inspection, Pressure Test, Exposed Pipe Report
- Introduce tablets to the field users
- Completed inspections received via email and organized in document management software. Very manual!
- Started in March 2015

## Phase 2: Integration

- Integrate between F2B and NPU
- Provide tool for Gas Operations to
  - Review\approve inspections
  - Reporting (audits)
- Inspections automatically stored and organized in NPU systems (Database, File Server, GIS)
- Started in March 2016

# Gas Daily Inspection

- Deployed March 2015
- Complete redesign
- Started with contracted inspectors
  - only one box per line can be checked
  - Required fields
- GPS Coordinates
- Attach photos



## DAILY INSPECTION REPORT – MAINS/HEADERS

Date: \_\_\_\_\_ Task (circle one): Main Header

Weather AM: \_\_\_\_\_ Weather PM: \_\_\_\_\_

Location – Street: \_\_\_\_\_

Closest Intersection: \_\_\_\_\_

CBYD Number: \_\_\_\_\_ Service Order Number: \_\_\_\_\_

Tailgate Meeting Held: Y / N

Increased Inspection Frequency Required: Y / N Number of Days: \_\_\_\_\_

Crew Member Name	Title	OQ Appro

### Inspection Checklist

Task	Y	N	N/A
Are at least two OQ'd fusion operators present?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was fusion plate checked for temperature today?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were pressure test reports reviewed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were exposed main reports reviewed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are photographs of all crossings within 14' attached?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was site material inspected for correctness and quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was backfill inspected for depth and quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are as-built drawings current and accurate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Quantity of fusions inspected: \_\_\_\_\_

Quantity of fusions found unsatisfactory: \_\_\_\_\_

Crew member performing fusions: \_\_\_\_\_

Action taken: \_\_\_\_\_

Inspector: \_\_\_\_\_

Norwich Public Utilities			
Gas Construction Daily Inspection Form			
Date: 7/31/2019		Project No:	
Arrival Time: 1:15 PM		Service Order Number:	
Address: 1-3 HAMILTON CT			
Contractor: NPU		Crew Foreman: Wallace, Matt	
Facility: Service		Work Type: Renew	
Operator Qualification			
Operator Qualifications Verified (OQ Compliance Written Plan)			
Total Qualified Persons on Site: 3		Total Unqualified Persons on Site: 0	
Excavation Area			
Valid CBYD (GO&M 5-3)			
CBYD Ticket No: 20192804135		Expiration Date: 8/11/2019	
All underground facilities located and verified via GIS mapping before excavation begins			
If mis-marked are there new ties and sketch			
Safety Inspection			
Proper PPE on-site (SG-116)			
Annually Inspected Fire Extinguisher On-site (SG-116)			
Is Work on State Road			
Proper Traffic Control Measures - Flaggers, placement (23 CRF 655.603)			
Does Excavation \ Trench meet NPU Safety			
Is electrical equipment used grounded			
Service Riser \ Meter Work			
Service riser meets code and clearances (CM 10-2)			
Did meter(s) require bollards (Detail G9, CM 10-10) Were bollards installed?			
Tracer wire visible at service riser (CM Dwg. 5G, 5H)			
Service riser valve closed and locked (NFPA 3.8.2)			
Service riser valve installed a minimum of 6" above ground			
Service riser installed at proper bury depth (Detail G5H, G5I, G5L)			
Meter installed. If yes, was meter installed a minimum of 12" above ground: _____			
Header Painted			
Backfilling			
Suitable backfill material and procedure used (CM 6, 7)			
Documentation			
Pressure Test Report Completed and Submitted			
Hot Work Report Completed and Submitted			
Exposed Pipe Report Completed and Submitted			
As-built Sketch of cut, new or renew installation			
Daily verification of calibrated equipment (pyrometers, fusion equip, torque wrench, gauges etc)			
Did any work include tie-in a Main to an existing Main			
Did any work include tie-in a Service to a Main			
If yes to 43 or 44, is there an as-built sketch showing tie-in			
Were proper purging procedures followed (96% gas reading)			
Newly installed utility properly post marked with size/type			
Damages			
Any damages witnessed, if yes please explain damage and repair below			

Norwich Public Utilities			
Gas Construction Daily Inspection Form			
Service Riser \ Meter Work			
Service riser meets code and clearances (CM 10-2)			
Did meter(s) require bollards (Detail G9, CM 10-10) Were bollards installed?			
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Header Painted			
Backfilling			
Suitable backfill material and procedure used (CM 6, 7)			
Documentation			
Pressure Test Report Completed and Submitted			
Hot Work Report Completed and Submitted			
Exposed Pipe Report Completed and Submitted			
As-built Sketch of cut, new or renew installation			
Daily verification of calibrated equipment (pyrometers, fusion equip, torque wrench, gauges etc)			
Did any work include tie-in a Main to an existing Main			
Did any work include tie-in a Service to a Main			
If yes to 43 or 44, is there an as-built sketch showing tie-in			
Were proper purging procedures followed (96% gas reading)			
Newly installed utility properly post marked with size/type			
Damages			
Any damages witnessed, if yes please explain damage and repair below			
250 Character Max			
Brief Description of Work Performed			
CREW DB APPROX 42' OF 1" PLS SERVICE & RISER. PLUMBERS SET THE HEADER.			
250 Character Max			
Inspector Observations, Field Corrections, Issues Noted			
SERVICE NOT TIED INTO MAIN YET, NOT TESTED.			
250 Character Max			
Inspection Information			
Inspector Name	ART ABBOTT	Departure Time:	
Inspector Signature	<i>AAA</i>	GPS Coordinates:	41.53016, -72.051
			Attach a Photo



# Pressure Test

- Deployed August 2015
- Complete redesign
- First form to internal crews
- Data quality rules
  - Lists
  - Auto-Calculate fields
  - Required Fields
- Logic to refuse form submission if certain conditions are not met.
  - Starting\Ending Pressure < Min Pressure
  - Duration times < Min times
- GPS Coordinates
- Foreman & Inspector sign-off



## TEST PRESSURE REPORT GAS/WATER DIVISION

LOCATION: \_\_\_\_\_

Main: \_\_\_\_\_ Type: \_\_\_\_\_ Size: \_\_\_\_\_ Length: \_\_\_\_\_  
 Service: \_\_\_\_\_ Type: \_\_\_\_\_ Size: \_\_\_\_\_ Length: \_\_\_\_\_  
 Other: \_\_\_\_\_

Date: \_\_\_\_\_ Time On: \_\_\_\_\_ a.m. \_\_\_\_\_ p.m.

Date: \_\_\_\_\_ Time Off: \_\_\_\_\_ a.m. \_\_\_\_\_ p.m.

MAOP of SYSTEM TESTED : \_\_\_\_\_

### TEST PRESSURE

	6-21	73	88	12	30	60
MAOP	in.wc.	in.wc.	in.wc.	PSIG	PSIG	PSI
Minimum Test Pressure	99	99	99	99	99	99
	PSIG	PSIG	PSIG	PSIG	PSIG	PSI

### TEST MEDIUM:

Air: \_\_\_\_\_ Inert Gas: \_\_\_\_\_ Natural Gas: \_\_\_\_\_

PRESSURE READINGS: Gauge: \_\_\_\_\_ Chart Recorder: \_\_\_\_\_

Start Test Pressure: \_\_\_\_\_ PSIG

Finish Test Pressure: \_\_\_\_\_ PSIG

### TESTING COMPANY:

Name: Norwich Public Utilities

Address: 16 South Golden Street Norwich CT. 06360

Signature of Company Representative: \_\_\_\_\_

Telephone Number: 860-823-4150

### LEAKS OR FAILURES AND DISPOSITION: (Please Describe)

\_\_\_\_\_  
 \_\_\_\_\_

Accepted Date: \_\_\_\_\_ Time: \_\_\_\_\_

Signature of Utility Employee/ Inspector: \_\_\_\_\_

## Norwich Public Utilities

### Pressure Test

Date: 8/5/2019		Service Order Number:	
Arrival Time: 7:20 AM			
Address: 363/365 Hamilton Ave		Apt/Unit #:	
Contractor: NPU		Crew Foreman: Wallace, Matt	

Test Information			
Pipe Type:	Main	Test Type:	Gauge
Pipe Length (ft):	106	Pipe Diameter (inches):	6.00
MAOP:	73 inwc	Minimum Pressure:	99 psig
Start Time:	11:38	Start Pressure:	99
End Time:	12:44	End Pressure:	99
Duration:	01:06	Start Temp:	82
Was Header Pressure Tested with Service?	No	End Temp:	82
Comments:		GPS Coordinates: 41.53143,-72.06004	

Foreman Signature: Wallace, Matt

Inspector Signature: Lee, Steve

# Exposed Pipe Reports

- Deployed August 2015
- Deployed to internal crews
- Similar to paper form
- Logic to refuse form submission if certain conditions are not met.
  - All required fields filled
- GPS Coordinates
- Additional integration with GIS
  - GIS data validation
  - Pipe replacement analysis



## INSPECTION OF EXPOSED PIPE GAS DIVISION

Location —Street: \_\_\_\_\_

By House No.: \_\_\_\_\_ Pole: \_\_\_\_\_ Other: \_\_\_\_\_

Service  Main  Size: \_\_\_\_\_ Depth of Pipe: \_\_\_\_\_

Types of Pipe: Plastic  Steel  Cast Iron

Condition of Pipe: Poor  Fair  Good

If Pitting, Depth of Pits: \_\_\_\_\_

Coating: Yes  No  Condition: \_\_\_\_\_

Coating Material: Epoxy  Plastic  Tar   
(Green) (Yellow) (Black)

Interior Condition: Checked  No check

If Checked : Tap Coupon  Pipe segment

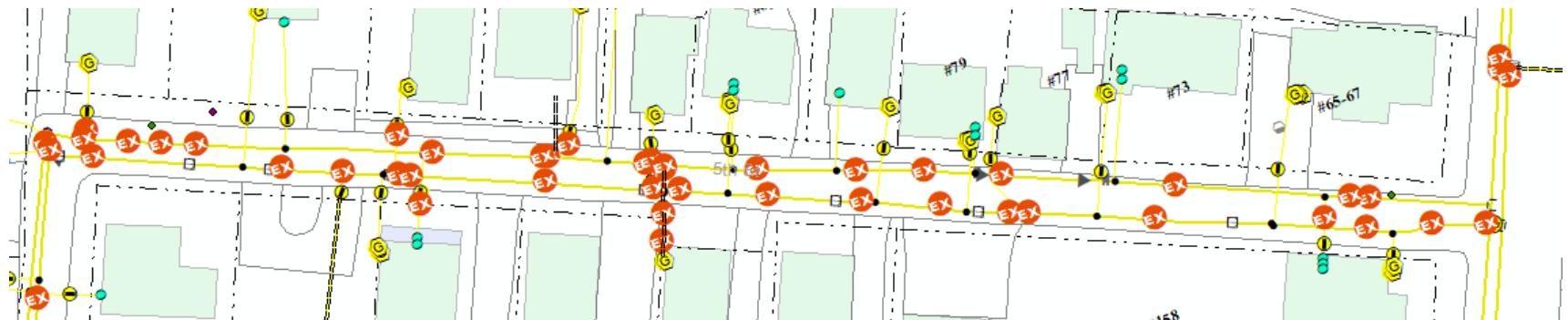
Condition : Poor  Fair  Good

Comments: \_\_\_\_\_

Signature of Person Reporting: \_\_\_\_\_

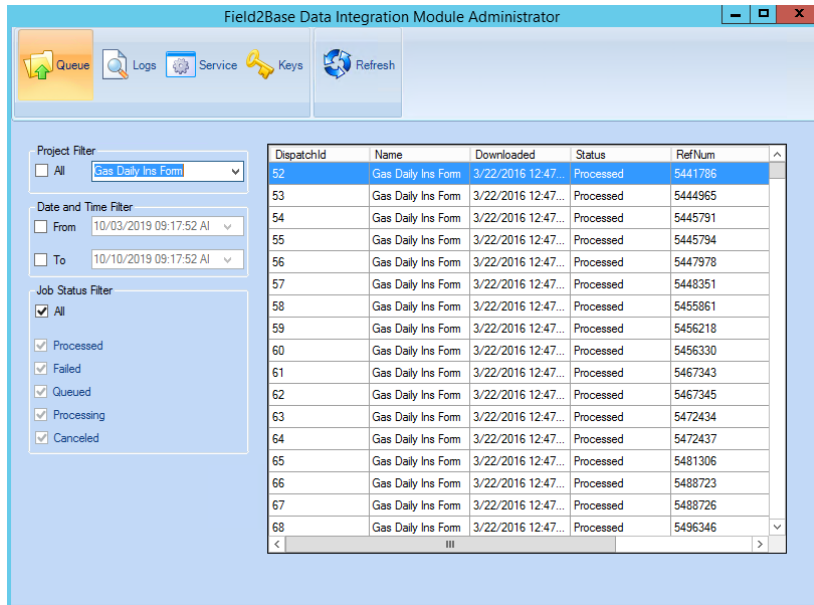
Signature of Secondary Qualified Reporter: \_\_\_\_\_

Norwich Public Utilities			
Exposed Pipe Report			
Date:	8/5/2019	Project No:	
Arrival Time:	7:20 AM	CBYD No:	20192804135
Address:	363/365 Hamilton Ave		
Contractor:	NPU	3 <sup>rd</sup> Party:	Inspector: Wallace, Matt
Exposed Pipe Information (Report on existing pipe only)			
Utility:	Gas	Inspected Facility:	Main
Pipe Material:	Plastic PE	Inspected Pipe Dia (in):	1.25
Pipe Coating Type:	Does Not Apply	Pipe Condition:	Good
Any Pits Observed?	No	Coating Condition:	
Interior Checked?	Yes	Depth of Pits:	
Interior Condition:	Good	Checked By:	Matthew Wallace
GPS Coordinates:	41.53151,-72.05958		
Comments:	Inspector Signature: Wallace, Matt		

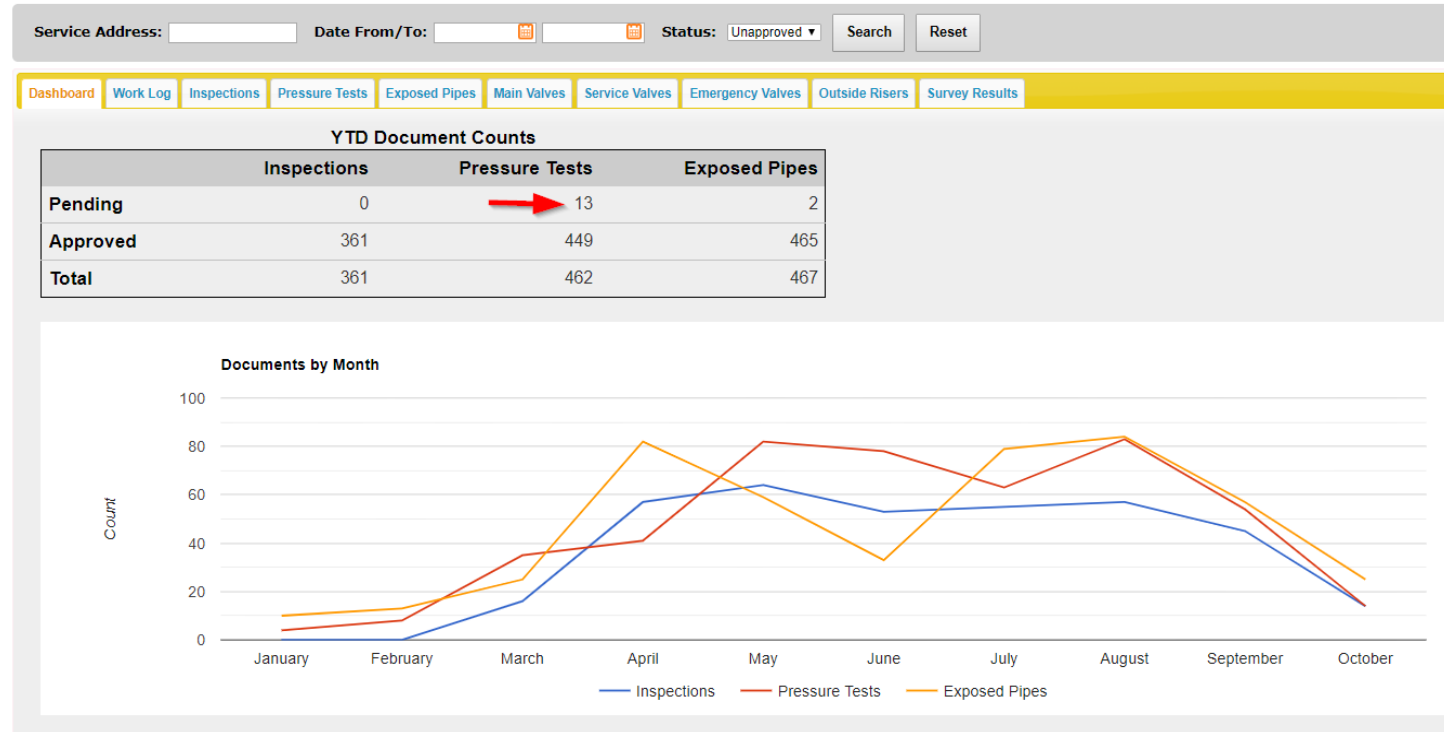


# Phase 2: Data Integration

- Deployed March 2016
- Installed F2B DIM (Data Integration Module)
  - Assisted by F2B Partner
- Integrated into SQL Database
- NPU IT built web-based dashboard
  - Review\approvals
  - Reporting



## Gas Inspection Manager



# Phase 2: Data Accessibility



## Gas Inspection Manager


Service Address:  Date From/To: 08/01/2019 08/31/2019 Status: Approved



- Dashboard
- Work Log
- Inspections**
- Pressure Tests
- Exposed Pipes
- Main Valves
- Service Valves
- Emergency Valves
- Outside Risers
- Survey Results

Date	Service Address	Service	Image	Foreman	Contractor	Work Type	Service Order	Inspector	CBYD	Approver
8/1/2019	<a href="#">15 Page St</a>	Service	Y	Gaska, Krzysztof	RHW	Renew		Steve Lee	20192804705	bhedler
8/1/2019	<a href="#">7 HAMILTON CT</a>	Service	Y	Wallace, Matt	NPU	Renew		ART ABBOTT	20192804135	bhedler
8/2/2019	<a href="#">12 JOHN GEORGE DR</a>	Service	Y	Wallace, Matt	NPU	New		ART ABBOTT	CONTRACTOR	bhedler
8/2/2019	<a href="#">180 PROSPECT ST</a>	Service	Y	Gaska, Krzysztof	RHW	Renew		ART ABBOTT	20193100326	bhedler
8/5/2019	<a href="#">123 Hamilton Ave</a>	Service	Y	LeFrancois, Joel	NPU	New		Steve Lee	20192804113	bhedler
8/5/2019	<a href="#">363-365 Hamilton Ave</a>	Main	N	Wallace, Matt	NPU	Renew		Steve Lee	20192804135	bhedler
8/5/2019	<a href="#">66-68 Page St</a>	Service	Y		RHW	Renew		Steve Lee	20193102877	bhedler
8/6/2019	<a href="#">111 HAMILTON AVE</a>	Service	Y	LeFrancois, Joel	NPU			ART ABBOTT	20192804104	bhedler
8/6/2019	<a href="#">367 HAMILTON AVE</a>	Service	Y	Wallace, Matt	NPU			ART ABBOTT	20193101323	bhedler
8/6/2019	<a href="#">72 Page St</a>	Service	N	Snay, Mike	RHW	Renew		Steve Lee	20193000753	bhedler
8/6/2019	<a href="#">95 BEECH DR</a>	Main	Y	Bohara, Dan	NPU	Repair		ART ABBOTT	20192800267	bhedler
8/7/2019	<a href="#">375 HAMILTON AVE</a>	Service	Y	Wallace, Matt	NPU			ART ABBOTT	20193101323	bhedler
8/7/2019	<a href="#">HAMILTON AVE @ PALMER ST</a>	Main	Y	LeFrancois, Joel	NPU	Renew		ART ABBOTT	20192902354	bhedler
8/8/2019	<a href="#">258 HAMILTON AVE</a>	Service	Y	Wallace, Matt	NPU	Renew		ART ABBOTT	20192804120	bhedler



# Phase 2: Data Accessibility

Norwich Public Utilities			
Gas Construction Daily Inspection Form			
Every line item should have one check box marked (Yes, No or N/A).		Date: 8/1/2019	Project No:
		Arrival Time: 10:03:00 AM	Service Order Number: 
		Address: 15 Page St	
		Contractor: RHW	Crew Foreman: Gaska, Krzysztof
		Facility: Service	Work Type: Renew
Yes	No	N/A	Item#
Operator Qualification			
✓			1
Operator Qualifications Verified (OQ Compliance Written Plan) Total Qualified Persons on Site: 3 Total Unqualified Persons on Site: 1			
Yes	No	N/A	Item#
Excavation Area			
✓			2
Valid CBYD (GO&M 5-3) CBYD Ticket No: 20192804705 Expiration Date: 8/10/2019			
✓			3
All underground facilities located and verified via GIS mapping before excavation begins			
		✓	4
If mis-marked is there new ties and sketch			
Yes	No	N/A	Item#
Safety Inspection			
✓			5
Proper PPE on-site (SG-116)			
✓			6
Annually Inspected Fire Extinguisher On-site (SG-116)			
	✓		7
Is Work on State Road			
✓			8
Proper Traffic Control Measures Flaggers, Cone layout, barriers, signage and construction vehicle placement (23 CRF 655.603)			
✓			9
Does Excavation \ Trench meet NPU Safety Guidelines (SG-116-Guide 8)			
✓			10
Is electrical equipment used grounded			
Yes	No	N/A	Item#
Plastic Pipe Work			
✓			11
Does plastic pipe meet 2 year exposure limit (CM 2-1)			
✓			12
Pressure Test Meet Requirements Requirements (GO&M 16-1 for Mains, GO&M 16-2 for Services)			
✓			13
Is the Foreman aware of MAOP conditions			
✓			14
Is there (2) qualified fusion operators on-site (CM 3-1)			
✓			15
Were all fusions performed and inspected by qualified personnel (CM 3-1) Fusion Performed By: Basks Fusion Inspected By: Lee			
	✓		16
Did any Fusions fail inspectors inspection (CM 3-1) If yes Fusion Performed By:			
		✓	17
If yes, were proper removal procedures followed (CM 3-1)			
✓			18
Tracer wire properly installed 5+/-" from pipe (CM 2-1)			
✓			18.1
Tracer wire continuity test performed and verified			
✓			19
Existing Plastic Pipe Inspected for Leaks 10% scratches or gauges (NGA Task CT31)			
✓			20
Underground clearance adequate (12") from other structures (CM 2-3, 7-1)			
✓			21
Min 6" of sand surrounding pipe (CM 2-3, 6-2, 7-1)			
✓			22
Pipe installed at required Depth (CM 2-3, 7-1)			
Yes	No	N/A	Item#
Steel Work			
	✓		23
New steel pipe meets manufacturing requirements (CM 5-1)			
	✓		24
Qualified Welder on-site (CM 8) Name of Qualified welder:			
	✓		25
Pressure Test Meet Requirements (GO&M 16-1 for Mains, GO&M 16-2 for Services)			
	✓		26
Did you observe pressure test?			
	✓		27
Is the Foreman aware of MAOP conditions			

✓			32.2	Service riser valve installed at proper bury depth (Detail G5H,G5I,G5L)
✓			32.3	Meter installed at proper bury depth If yes, was meter installed a minimum of 12" above ground? Yes
✓			32.4	Header Painted
Yes	No	N/A	Item#	Backfilling
✓			33	Suitable backfill material and procedure used (CM 6, 7)
Yes	No	N/A	Item#	Documentation
✓			34	Pressure Test Report Completed and Submitted
		✓	34.1	Hot Work Report Completed and Submitted
✓			35	Exposed Pipe Report Completed and Submitted
✓			36	As-built Sketch of cut, new or renew installation
✓			37	Daily verification of calibrated equipment (pyrometers, fusion equip, torque wrench, gauges etc)
✓			38	Did any work include tie-in a Main to an existing Main
✓			39	Did any work include tie-in a Service to a Main
✓			40	If yes to 38 or 39, is there an as-built sketch showing tie-in
✓			41	Were proper purging procedures followed (96% gas reading)
✓			41.1	Newly installed utility properly post marked with size/type
Yes	No	N/A	Item#	Damages
	✓		42	Any damages witnessed, if yes please explain damage and repair below
Work Performed				
Inspector Observation				
Inspection Image				
				
Inspection Information				
Inspector Name: Steve Lee			Departure Time:	
Inspector Signature: 			GPS Coordinates: 41.53297,-72.06049	
Approval Information				
Approver: bhedler			Approval Date: 8/6/2019 12:45:00 PM	
Comments:				

# Wrap-up

- Expansion of F2B use since 2015
  - 31 Devices using F2B (started with 6)
  - 20 Forms in production
  - Average 1775 completed forms a year
    - This year will be near 2750
  - Internal and external contactors
  - Leverage workflow (LOTO)
- Various methods of data delivery based on need
  - Email pdf
  - Pdf directly into file server (auto name)
  - Data inserts into sql database
- ESRI Collector used for more asset-based inspections
  - Valve inspections, Hydrant flushing, MS4 inspections etc.

## F2B Forms

### Gas Distribution

- Daily Inspection
- Pressure Test
- Exposed Pipe Report
- ROW Inspections
- Weekly Rectifier Readings
- Annual Peak Shaver
- Monthly Service Meter Readings
- Weekly CNG Readings
- Weekly LNG Readings
- Monthly LNG Maintenance
- Bridge Inspections

### Other Utilities

- Job Briefing Form (Pre-fill)
- Confined Space
- Lock-out Tag Out
- Sewer Air Test
- Sewer Pump Sta Checks
- Field Inspection Form
- Water Main Disinfection



field2base

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