



# Managing Gas Facility Inspections with Workforce for ArcGIS

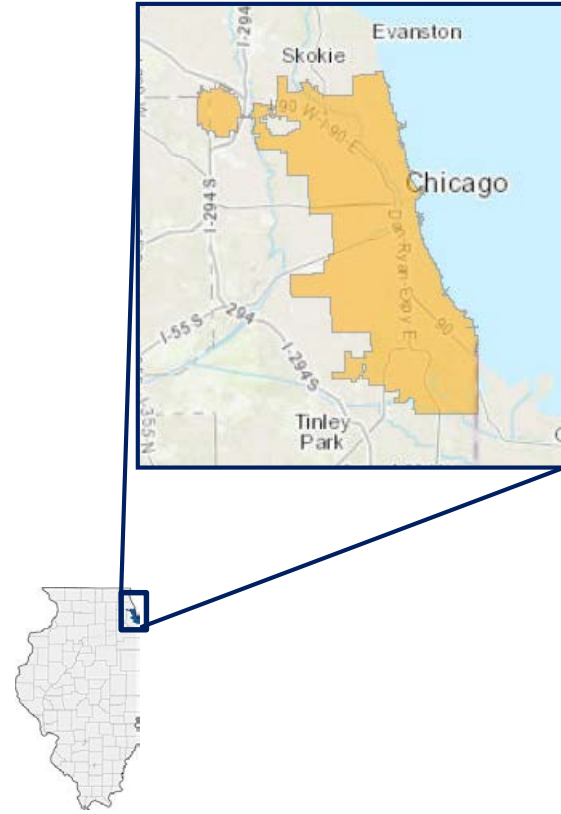
Esri GeoConX 2017

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NATURAL GAS DELIVERY

NORTH SHORE GAS®  
NATURAL GAS DELIVERY

# Peoples Gas

- Founded in **1850**
- Deliver natural gas to about **843,000 customers** in the city of Chicago.
- **~20 GIS staff** supporting Peoples Gas and North Shore Gas



# Background

- System Operations performs inspections on:
  - Gate station components
  - District regulator stations
  - Valves
  - and other facilities...



# Background

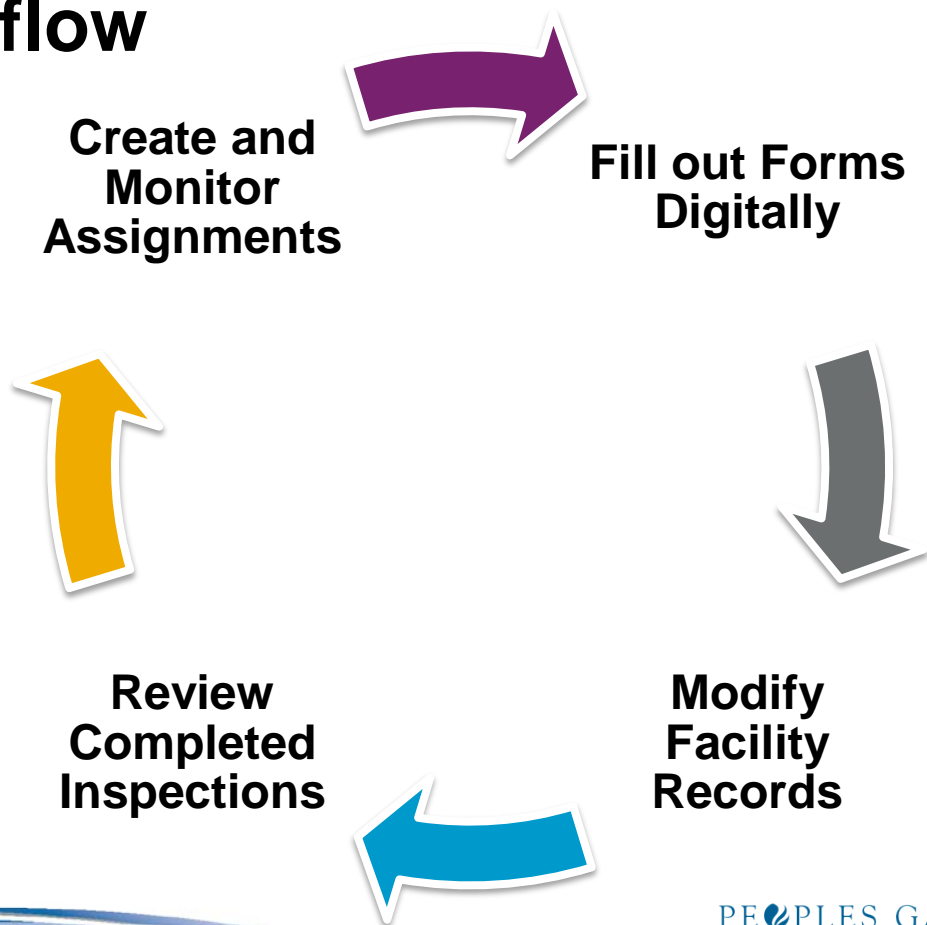
- System Operations Group asked GIS group for help shifting away from paper record-keeping:
  - Filing cabinets full of paper
  - Difficult to retrieve and audit
  - Lost paperwork
- Initial focus on non-regulatory work
  - Vault Inspection Runs
  - Maintenance Work



- Paper used for district regulator (**vault**) inspections and **maintenance work.**

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# Target Workflow



# Target Workflow

Workforce



**Create and  
Monitor  
Assignments**



Survey123

**Fill out Forms  
Digitally**



**Modify  
Facility  
Records**



Collector



Survey123  
Web



**Review  
Completed  
Inspections**





# Configuration



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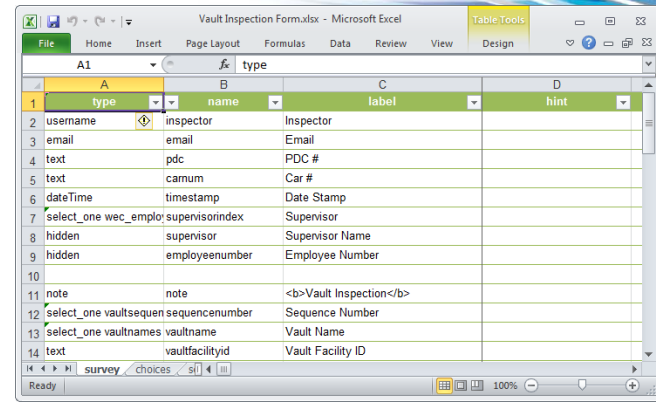
# Configuration Steps

- Build and Configure:
  1. Forms (Survey123)
    - Vault Run
    - Maintenance
  2. Maps (Collector)
  3. Project (Workforce)

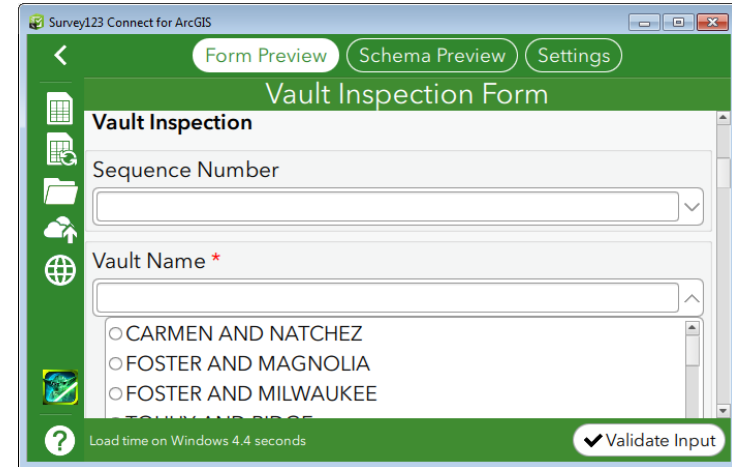


# Form Configuration

- Survey123 Connect
  - Allows for XLSForm-based authoring of surveys
  - Preview appearance and functionality of survey
  - Surveys published to ArcGIS Online or Portal



	A	B	C	D
	type	name	label	hint
2	username	inspector	Inspector	
3	email	email	Email	
4	text	pdc	PDC #	
5	text	carum	Car #	
6	dateTime	timestamp	Date Stamp	
7	select_one wec_employ	supervisorindex	Supervisor	
8	hidden	supervisor	Supervisor Name	
9	hidden	employeenumber	Employee Number	
10				
11	note	note	<b>Vault Inspection</b>	
12	select_one vaultsequen	sequencenumber	Sequence Number	
13	select_one vaultnames	vaultname	Vault Name	
14	text	vaultfacilityid	Vault Facility ID	



Survey123 Connect for ArcGIS

Form Preview Schema Preview Settings

Vault Inspection Form

Vault Inspection

Sequence Number

Vault Name \*

☐ CARMEN AND NATCHEZ

☐ FOSTER AND MAGNOLIA

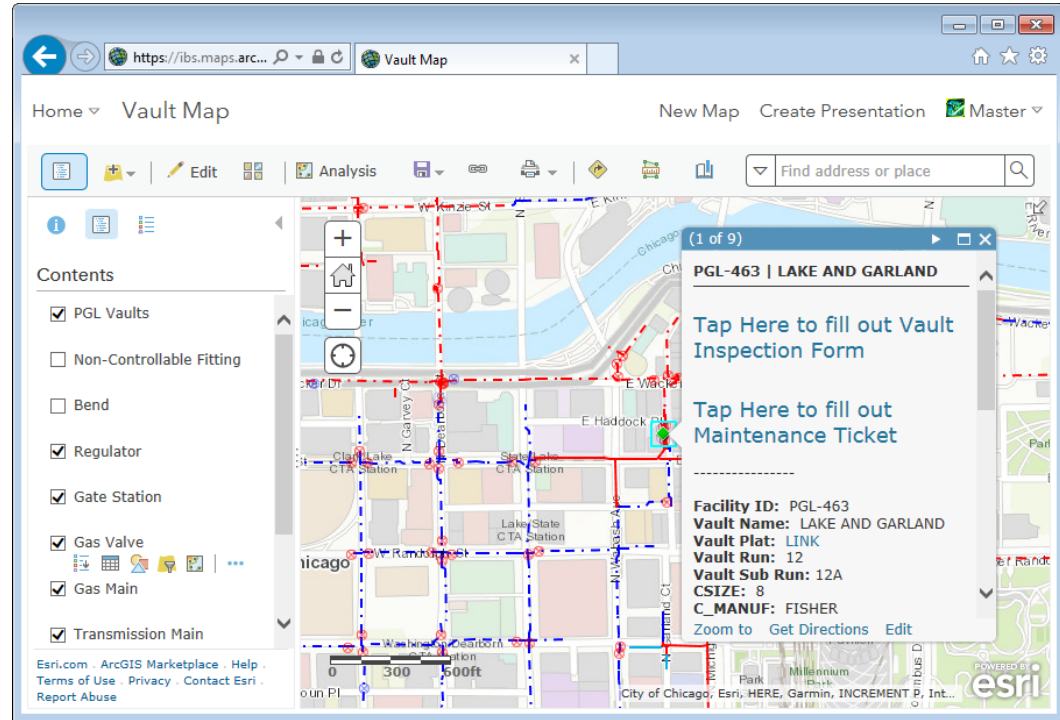
☐ FOSTER AND MILWAUKEE

Load time on Windows 4.4 seconds

Validate Input

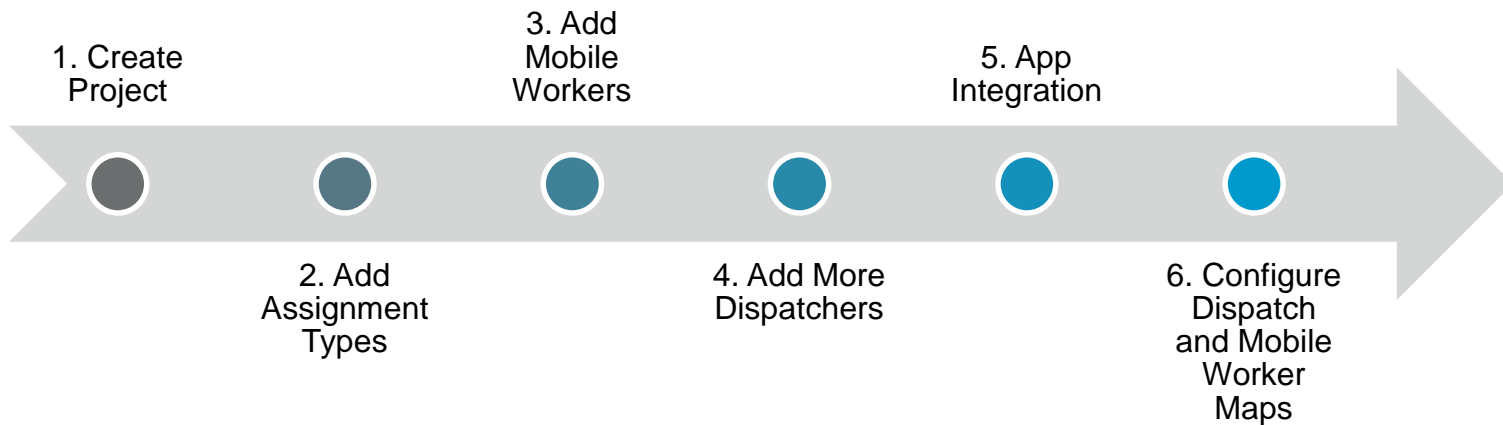
# Map Configuration

- ArcGIS Online/Portal
  - Include feature service(s) to be edited
  - Configure
    - Scale dependencies
    - Edit permissions
    - Popup customization
    - Custom URL linking to Survey123



# Workforce: Project Configuration

- Workforce Web App
  - Project Creation (6 steps) and Configuration
  - Assignment Dispatch



# Workforce: Project Configuration

1. **Create Project**
2. Add Assignment Types

### Project Setup

1 of 4 Steps Completed

Add the types of work that your mobile workers will be performing.

- 1 Create Project ✓
- 2 Add Assignment Types
- 3 Add Mobile Workers
- 4 Add More Dispatchers

### Create a Project

Name \*

Demonstration

Summary (Optional)

This is a demonstration.

Give your project a summary that describes what it will be used for.

Cancel

Create project

Assignment types specify the different kinds of work that your mobile workers need to perform. When creating a new work assignment, dispatchers choose from a list of assignment types.

### Add an Assignment Type

Enter a new type... 

+ Type

Assignment Type

Inspect Vault 

✕

Perform Maintenance 

✕

# Workforce: Project Configuration

1. Create Project
2. **Add Assignment Types**

### Project Setup

1 of 4 Steps Completed

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Assignment types specify the different kinds of work that your mobile workers need to perform. When creating a new work assignment, dispatchers choose from a list of assignment types.

### Add an Assignment Type

Enter a new type...

+ Type

Assignment Type

Inspect Vault

Perform Maintenance

# Workforce: Project Configuration

3. **Add Mobile Workers**
4. Add More Dispatchers

### Project Setup

2 of 4 Steps Completed

Add users that will be working on and completing assignments in the field.

- 1 Create Project ✓
- 2 Add Assignment Types ✓
- 3 Add Mobile Workers
- 4 Add More Dispatchers

Add users to this project. [Show more...](#)

Organization User

DB

David Burke (DJBu...

▼

Project Role

📱

Mobile Worker

▼

+ User

☒ Only search for users in my organization.



# Workforce: Project Configuration

3. Add Mobile Workers
4. **Add More Dispatchers**

### Project Setup

3 of 4 Steps Completed


Add some more users who will be responsible for creating and assigning work.

[Skip this step »](#)

- 1 Create Project ✓
- 2 Add Assignment Types ✓
- 3 Add Mobile Workers ✓
- 4 Add More Dispatchers

Add users to this project. [Show more...](#)

Organization User

 Todd Burciaga (tm...

Project Role

 Dispatcher

+ User

☒ Only search for users in my organization.

# Workforce: Project Configuration


## Initial Setup Complete

[OVERVIEW](#) [ASSIGNMENT TYPES](#) [USERS](#) [ADVANCED](#)

### Project Setup

4 of 4 Steps Completed

Project setup is now complete. Continue adding types and users or try it out now.



Project Setup Complete

[Open Project](#)


# Workforce: Project Configuration

## 5. App Integration

### App Integration ✓


Collapse ^

App integrations maximize the efficiency of your mobile workers by providing directions and the maps and forms needed to complete their work. [More info](#)




Navigator for ArcGIS ✓

Remove



Collector for ArcGIS

Add



Survey123 for ArcGIS

Add

### Location Tracking

Collapse ^

View where your workers have been when their status is set to Working. The interval determines how often the worker's location is recorded.

☐ Enable

0 min, 30 sec

30 sec

15 min

Update




### Step 1 of 2: Integrate Collector for ArcGIS

✕

Integrate the Collector map with the Project or specific Assignment Types.


Vault

🔍



Vault Map

Updated Aug 14, 2017



Cancel

Next



### Step 2 of 2: Integrate Collector for ArcGIS

✕

Integrate the Collector map with the Project or specific Assignment Types.

☐ Project (applies to all assignment types)

☒ Inspect Vault

☐ Perform Maintenance

Cancel


Done


# Workforce: Project Configuration

## 5. App Integration


### App Integration


App integrations maximize the efficiency of your mobile workers by providing directions and the maps and forms needed to complete their work. [More info](#)



Navigator for ArcGIS 

Remove




Collector for ArcGIS 

Add Remove All

Assignment type Inspect Vault is integrated to the Vault Map Collector map

Edit Remove




Survey123 for ArcGIS


Add

### Step 1 of 2: Integrate Survey123 for ArcGIS

Integrate the Survey123 form with the Project or specific Assignment Types.

Vault



Vault Inspection Form  
Updated Aug 22, 2017 

Cancel

Next

### Step 2 of 2: Integrate Survey123 for ArcGIS

Integrate the Survey123 form with the Project or specific Assignment Types.

☐ Project (applies to all assignment types)

☒ Inspect Vault

☐ Perform Maintenance


Cancel

Done



# Workforce: Project Configuration

## 5. App Integration



### App Integration

Collapse 

App integrations maximize the efficiency of your mobile workers by providing directions and the maps and forms needed to complete their work. [More info](#)

 **Navigator for ArcGIS** 



Remove

 **Collector for ArcGIS** 

Add Remove All

Assignment type Inspect Vault is integrated to the Vault Map Collector map

Edit Remove

 **Survey123 for ArcGIS** 


Add Remove All

Assignment type Inspect Vault is integrated to the Vault Inspection Form Survey123 form

Edit Remove

# Workforce: Project Configuration

## 6. Configure Dispatch and Mobile Worker Maps



About this Project

This is a demonstration.

Open Project

---

Users:

3


1 Mobile Workers,  
2 Dispatchers


Assignments:

0

0 Completed, 0 Assigned,  
0 Unassigned

Maps:

 Dispatcher map

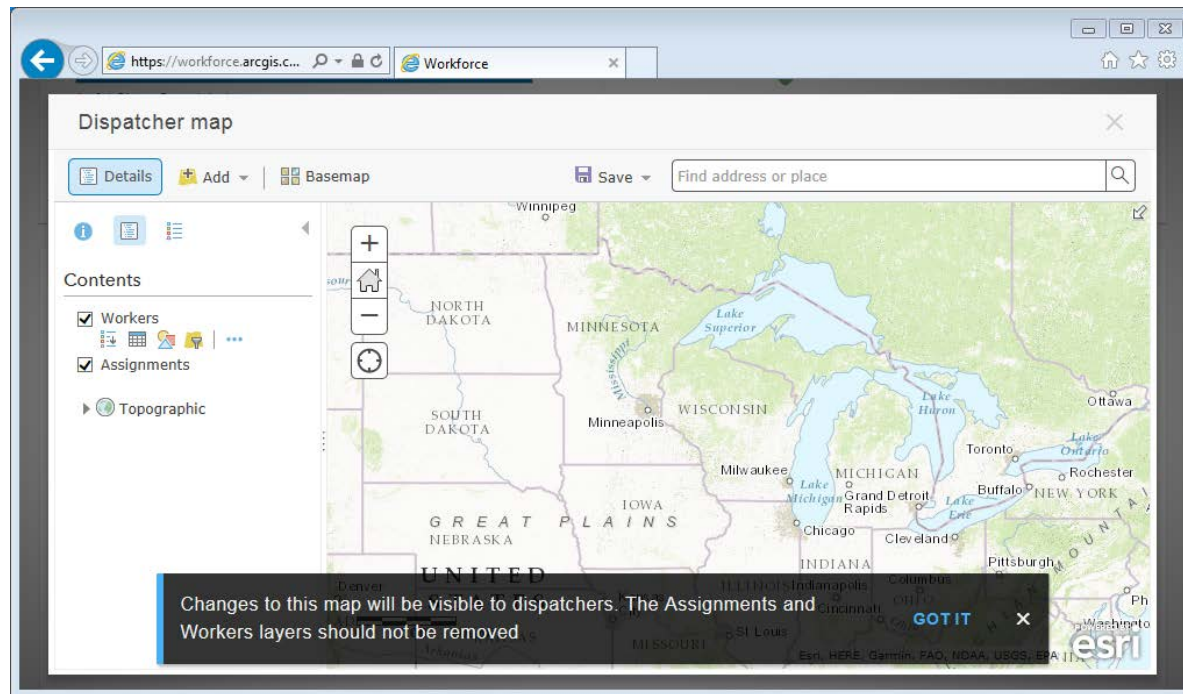
 Worker map

Configure the maps used by this project.

# Workforce: Project Configuration

## 6. Configure Dispatch and Mobile Worker Maps

- Add operational layers (e.g., gas system)





# Workforce: Project Configuration

## 6. Configure Dispatch and Mobile Worker Maps

- Enable Querying in Dispatch Map
  - Access each map's Web Map Settings through ArcGIS Online/Portal to enable query functionality within Workforce

Application Settings

Select the tools and capabilities to enable in applications that access this web map.

- ☒ Routing
- ☒ Measure Tool
- ☒ Basemap Selector
- ☒ Find Locations [-]

Hint text

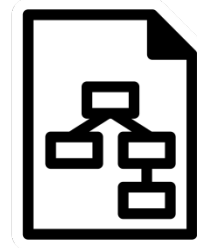
Enter Vault Run & Subgroup (8A), Valve ID, Regulator ID, or Address

☒ By Layer

Regulator ▼	FACILITY_ID ▼	Contains ▼
PGL_Vaults ▼	Sub Run ID ▼	Equals ▼
Valve ▼	FACILITY_ID ▼	Contains ▼

Add Layer

# Workflows

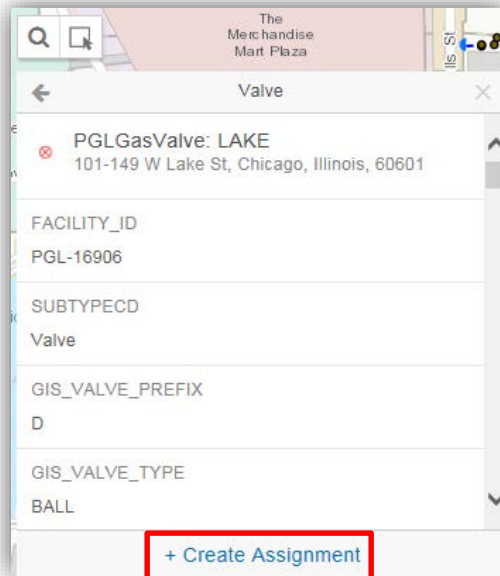
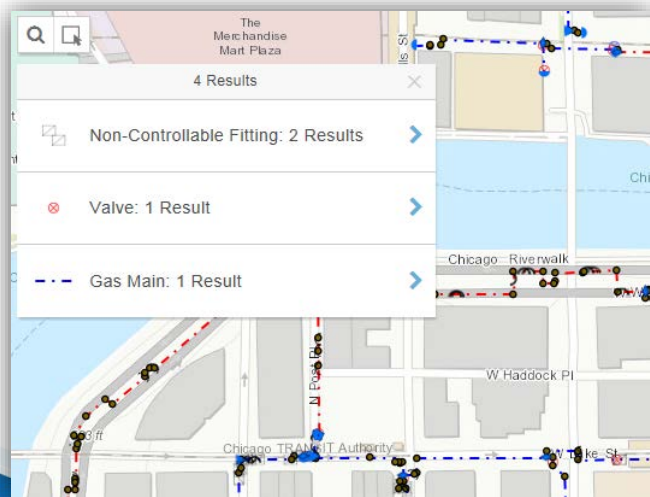


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# Workforce: Dispatch Workflows

- Creating Facility Maintenance Assignments

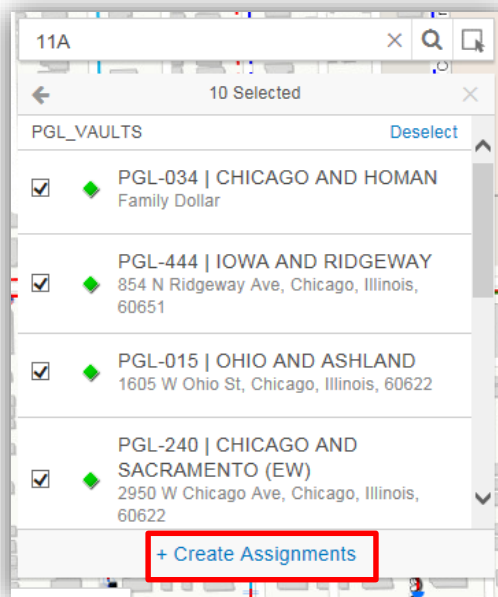
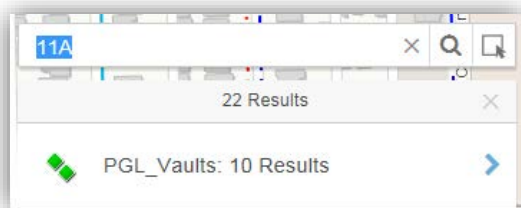


A "Create Assignment" form for the facility "PGLGasValve: LAKE". The form includes the following fields and options:

- Assigned to:** A dropdown menu showing "Todd Burciaga" with a profile picture.
- Priority:** A dropdown menu showing "High".
- Due Date:** A date input field showing "9/8/2017".
- Time:** An empty time input field.
- ID:** A text input field with a question mark icon.
- Description:** A large text input field.
- Attachments:** A section with a plus icon and the text "Add an attachment using drag and drop or by selecting a file."
- Buttons:** "Create Assignment" and "Cancel" buttons at the bottom.

# Workforce: Dispatch Workflows

- Creating Vault Inspection Assignments



Create Assignments

Assignment Type \*

Vault Inspection

Location \*

[Search for an address](#) or click on the map to add new locations.

PGL-034 | CHICAGO AND HOMAN

PGL-444 | IOWA AND RIDGEWAY

PGL-015 | OHIO AND ASHLAND

PGL-240 | CHICAGO AND SACRAMENTO (EW)

PGL-007 | CHICAGO AND PULASKI

PGL-270 | IOWA AND LEAMINGTON

PGL-054 | IOWA AND WALLER

PGL-522 | IOWA AND DAMEN

PGL-525 | IOWA AND WESTERN

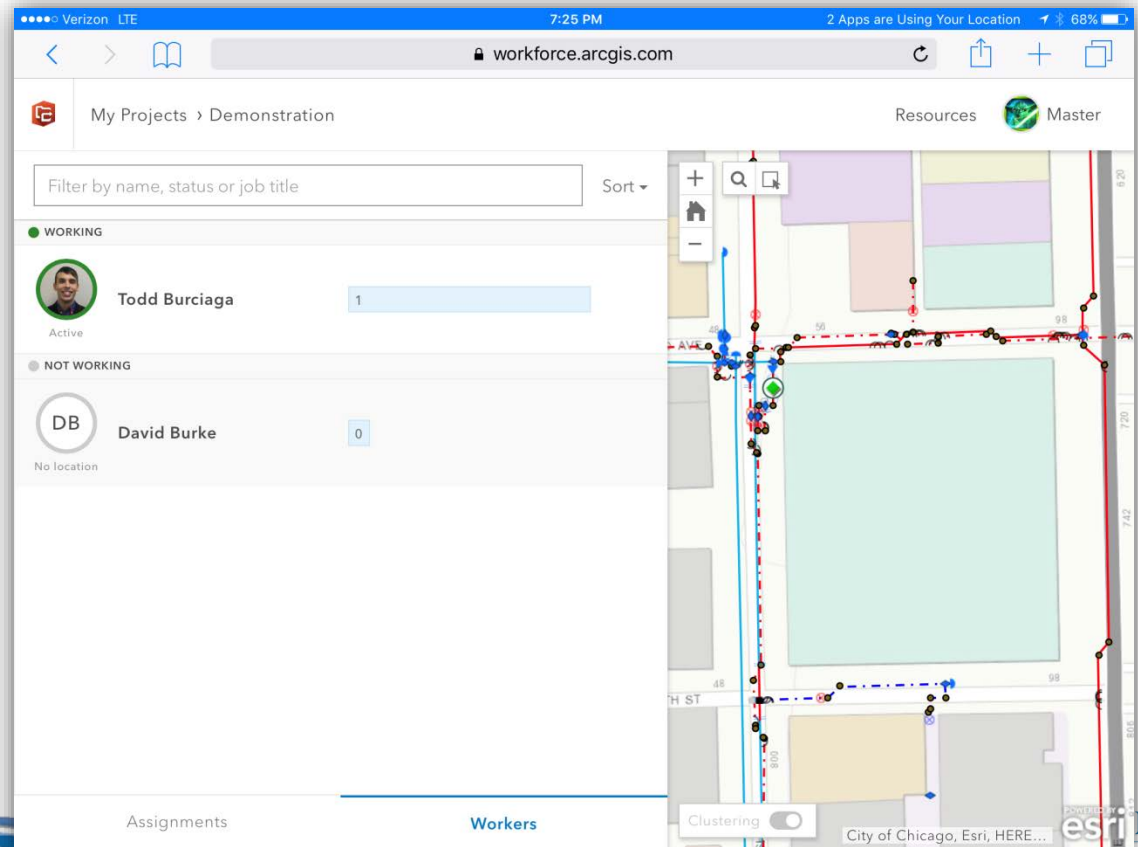
PGL-067 | GRAND AND CALIFORNIA

Assigned to

Create Assignments Cancel

# Workforce: Dispatch Workflows

- View Worker Status



# Workforce: Dispatch Workflows

- REST API
  - Can create assignments by pushing work orders from external systems

## Create an assignment through the REST API

Workforce works with the content of the Assignments feature layer, regardless of how the records were created. There is no requirement to create assignments through the Workforce web app. If the record is created in the Assignments feature layer properly through the REST API, Workforce recognizes it as a valid assignment in both the web and mobile apps.

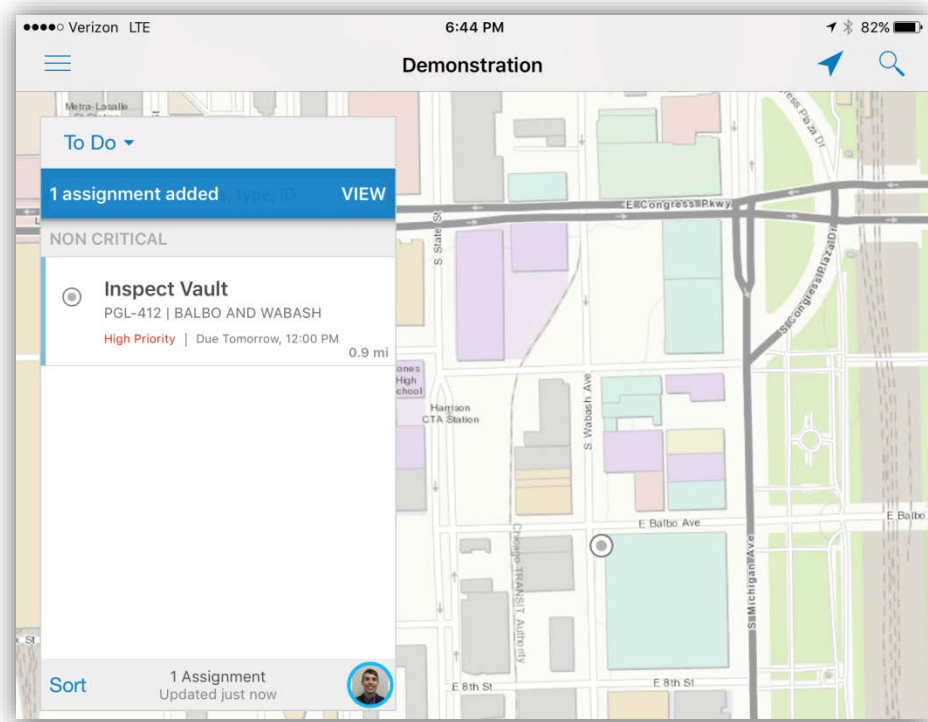
When creating assignments, use the REST API [Add features](#) command. There are some fields you are required to provide values for, some fields you can provide values for if your assignment requires them, and others that you shouldn't provide values for.

You need to supply values for the following fields:

Field	Definition	Value to provide
SHAPE	The point location of the assignment	An x,y coordinate pair
status	The assignment's status, from the values in the Assign_Status domain	<ul style="list-style-type: none"><li>■ 0 (Unassigned) to create unassigned work</li><li>■ 1 (Assigned) if you are going to assign the work as part of its creation</li></ul> <div><b>⚠ Caution:</b> If you are going to assign the work, you also need to include values for the workerId and assignedDate fields, described in a later table.</div>
assignmentType	The type of the assignment, from the values in the Assign_Type domain	Any valid value from the Assign_Type domain
location	Text description of the point location of the assignment	An address; an x,y coordinate pair; or any descriptive text
assignmentRead	Specifies if the worker has viewed the assignment	0 since the assignment is unread
dispatcherId	The ID of the dispatcher creating the assignment (dispatchers.OBJECTID from the Dispatchers layer)	May be the dispatcher ID for the ArcGIS organizational user you are connected as, or could be the ID of a particular dispatcher associated with the project

# Workforce: Mobile Worker Workflow

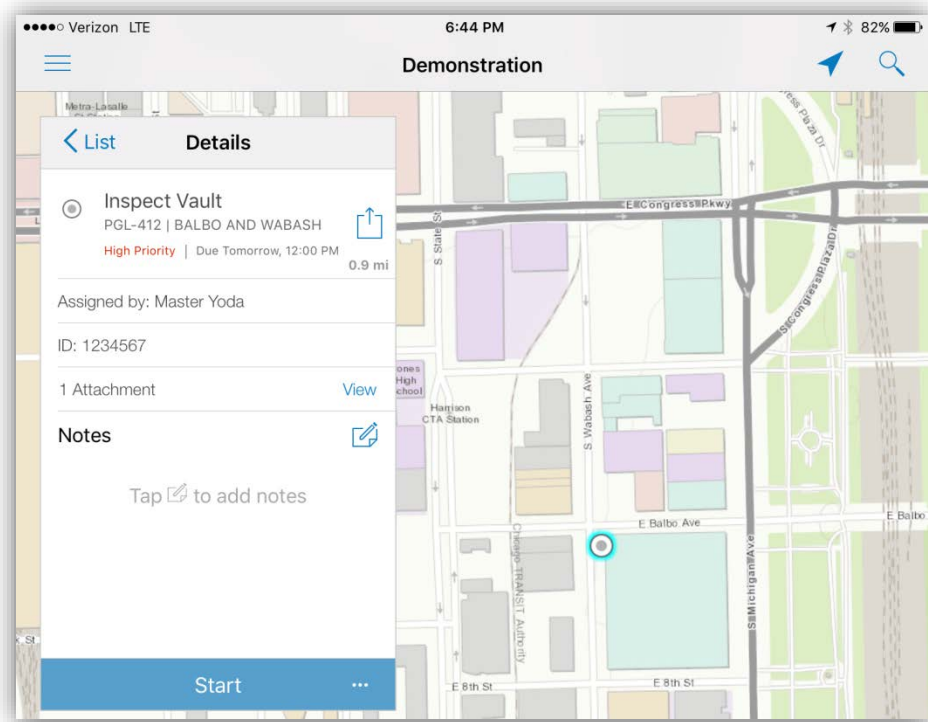
## 1. Assignment Received



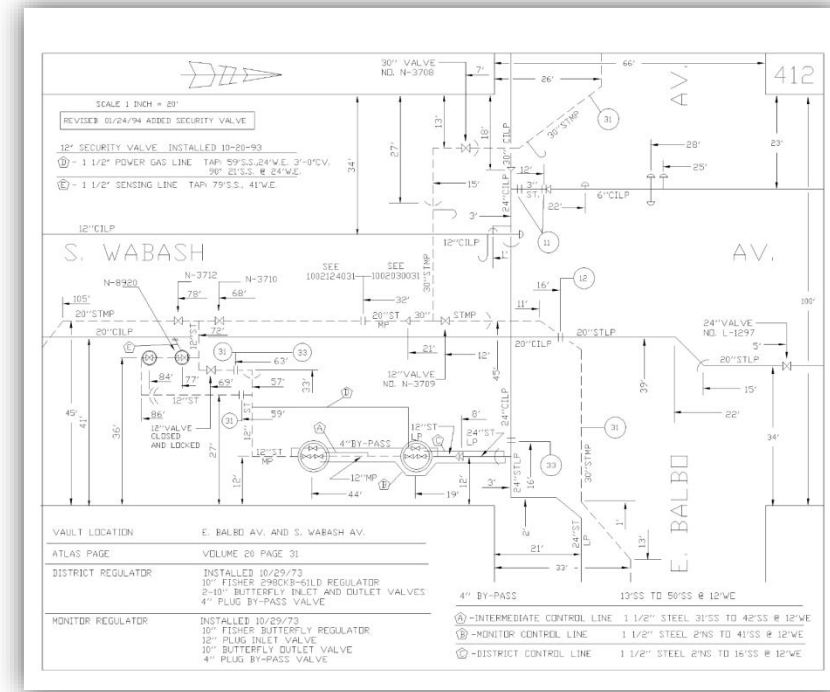


# Workforce: Mobile Worker Workflow

## 2. Accept and Start Work

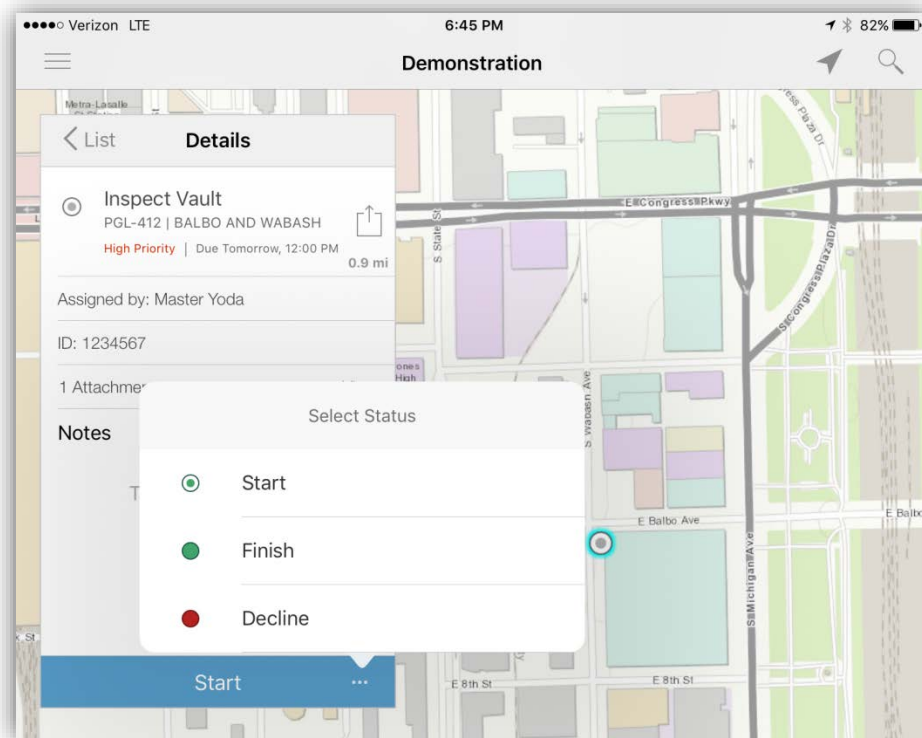


### 3. View Attachments if needed



# Workforce: Mobile Worker Workflow

## 4. Change States to “Start”



# Workforce: Mobile Worker Workflow

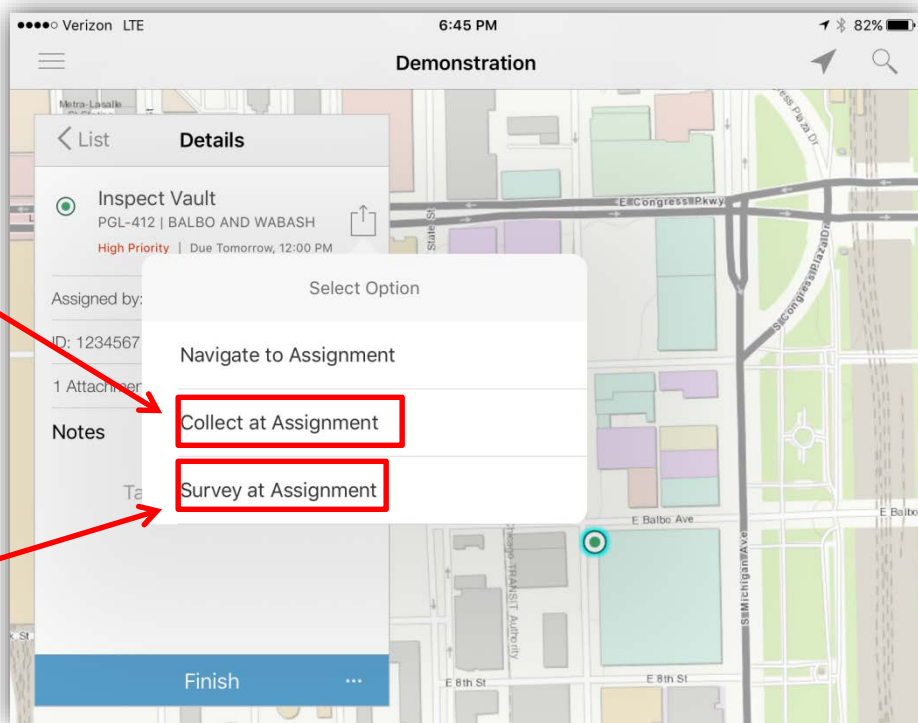
## 5. Tap “Survey at Assignment” to Complete Inspection Form



Modify Feature  
Location  
or Attributes



Complete  
Inspection Form



# Workforce: Mobile Worker Workflow

## 6. Populate form

The screenshot shows a mobile application interface for a 'Vault Inspection Form'. The status bar at the top indicates 'Verizon LTE', '6:46 PM', and 'Workforce is Using Your Location'. The form is titled 'Vault Inspection Form' and includes the following fields and sections:

- PDC #**: Text input field with value '1234'.
- Car #**: Text input field with value '1221'.
- Date Stamp**: Two input fields, one for the date '9/7/17' and one for the time '6:45 PM'.
- Supervisor**: Text input field with value 'Alonzo J. Foster | 114826'.
- Vault Inspection**: Section header.
- Sequence Number**: Text input field with value '1'.
- Vault Name \***: Text input field with value 'BALBO AND WABASH'.
- Vault Facility ID**: Text input field with value 'PGL-412'.
- Security Valve?**: Text input field with value 'YES'.
- Vault Shut Down?**: Text input field with value 'NO'.
- Regulator Size**: Section header.
- Regulator Size (in.) - Control**: Text input field with value '10'.
- Regulator Size (in.) - Monitor**: Text input field with value '10'.
- Outlet Pressure**: Text input field.

A green checkmark icon is visible at the bottom right of the form, indicating completion or submission.

# Workforce: Mobile Worker Workflow

## 6. Populate form

The screenshot shows a mobile application interface for a 'Vault Inspection Form'. The status bar at the top indicates 'Verizon LTE', '6:48 PM', and 'Workforce is Using Your Location'. The form is titled 'Vault Inspection Form' and includes a close button (X) and a menu icon (three lines). The form fields are as follows:

- Maximum Open:** A text input field containing '1/16'.
- Current Open:** A text input field containing '20%'.
- Vault Condition:** A section header for the following items:
  - Vault Exterior:** Radio buttons for 'OK' (selected) and 'Abnormal'.
  - Vault Interior:** Radio buttons for 'OK' (selected) and 'Abnormal'.
  - Water Accumulation - Control:** Radio buttons for 'OK' (selected) and 'Abnormal' (highlighted in blue).
  - Water Accumulation - Monitor:** Radio buttons for 'OK' (selected) and 'Abnormal'.
  - Water Accumulation - Security Valve:** Radio buttons for 'OK' (selected) and 'Abnormal'.
  - CDR Operation:** Radio buttons for 'OK' (selected) and 'Abnormal'.
- Battery Status:** A section header for the following items:
  - Main 1.6 Level:** A text input field.
  - Lithium 3.6 Level:** A text input field.
  - Battery Replaced?:** Radio buttons for 'Yes' and 'No' (selected).
- Details:** A section header for a text input field with the placeholder text: 'Indicate exact location & source of abnormal condition and if any action has been taken'.

A green checkmark icon is visible at the bottom right of the form, indicating a successful submission or completion.

# Workforce: Mobile Worker Workflow

## 6. Populate form

The screenshot displays the 'Vault Inspection Form' on a mobile device. The status bar at the top shows 'Verizon LTE', '6:50 PM', and 'Workforce is Using Your Location'. The app header is green with a close button and a menu icon. The form is divided into sections: 'Battery Status' with input fields for 'Main 1.6 Level' (value: 1.5) and 'Lithium 3.6 Level' (value: 3.5), and a 'Battery Replaced?' section with radio buttons for 'Yes' and 'No' (selected). Below is a 'Details' section with a text area for location and action. At the bottom is an 'Attachments' section with a camera icon and a folder icon. A green bar at the very bottom contains a white checkmark icon.

Verizon LTE 6:50 PM Workforce is Using Your Location 80%

**Vault Inspection Form**

**Battery Status**

Main 1.6 Level  
1.5

Lithium 3.6 Level  
3.5

Battery Replaced?  
☐ Yes ☒ No

**Details**

Indicate exact location & source of abnormal condition and if any action has been taken

**Attachments**

Camera icon Folder icon

✓

# Workforce: Mobile Worker Workflow

## 6. Submit form

The screenshot displays the 'Vault Inspection Form' app on a mobile device. The top status bar shows 'Verizon LTE', '6:50 PM', and 'Workforce is Using Your Location'. The app header is green with a close button and a menu icon. The form fields include:

- PDC #: 1234
- Car #: 1221
- Date Stamp: 9/7/17, 6:45 PM
- Supervisor: Alonzo J. Foster | 114826

A central white box with a green checkmark icon and the text 'Survey Completed' is displayed. Below it, it states 'Your device is online' and asks 'Would you like to send the survey now?'. Three green buttons are provided: 'Send Later', 'Send Now', and 'Continue this survey'.

Below the confirmation box, the form continues with:

- Vault Shut Down? NO
- Regulator Size**
- Regulator Size (in.) - Control: 10
- Regulator Size (in.) - Monitor: 10
- Outlet Pressure: 7

The bottom of the screen shows a green bar with a white checkmark icon.



# Workforce: Mobile Worker Workflow

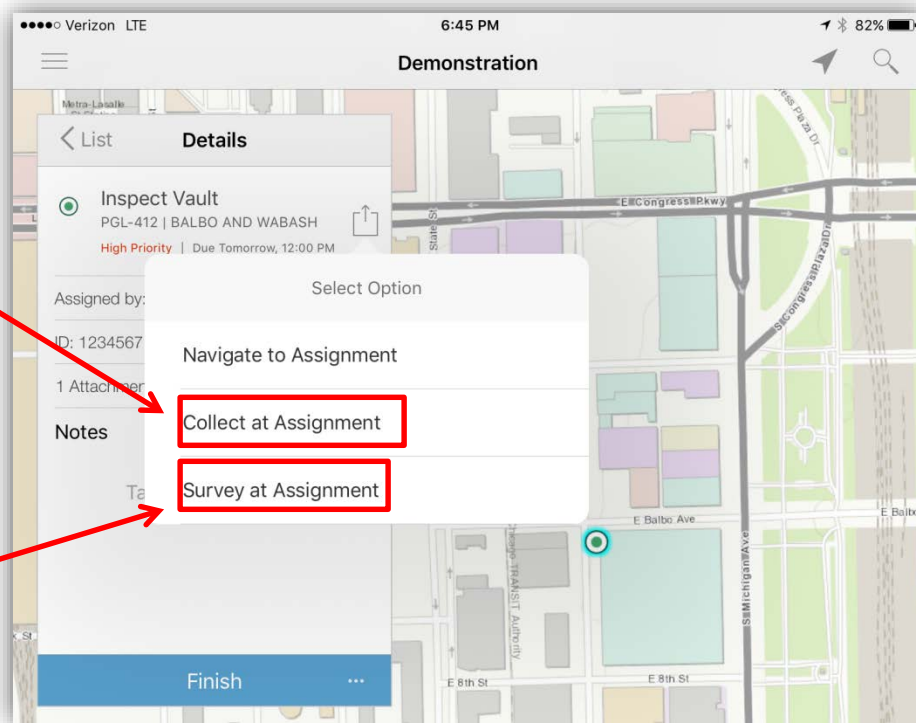
7. Tap “Collect at Assignment” to update feature location or attributes



Modify Feature  
Location  
or Attributes

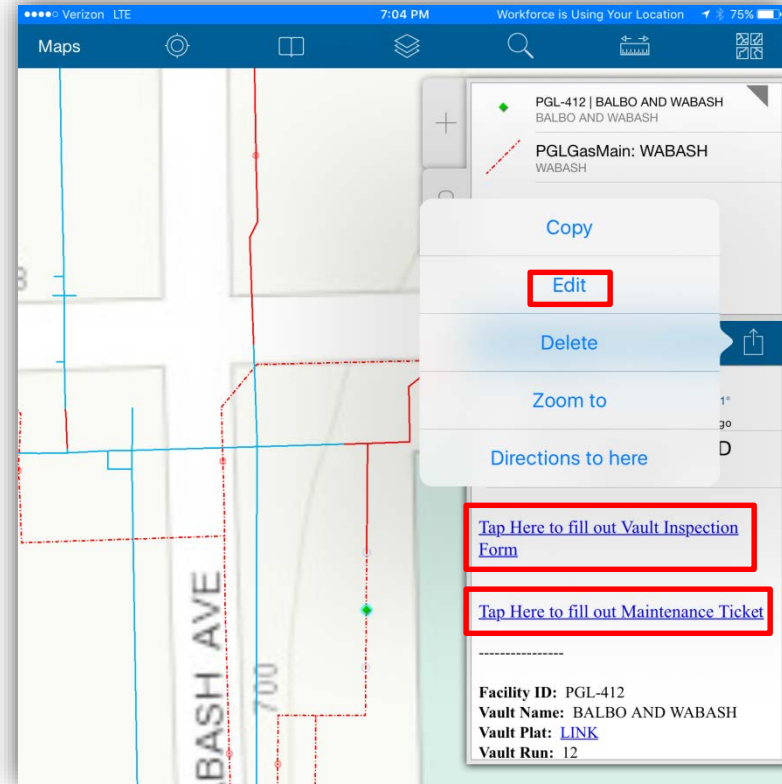
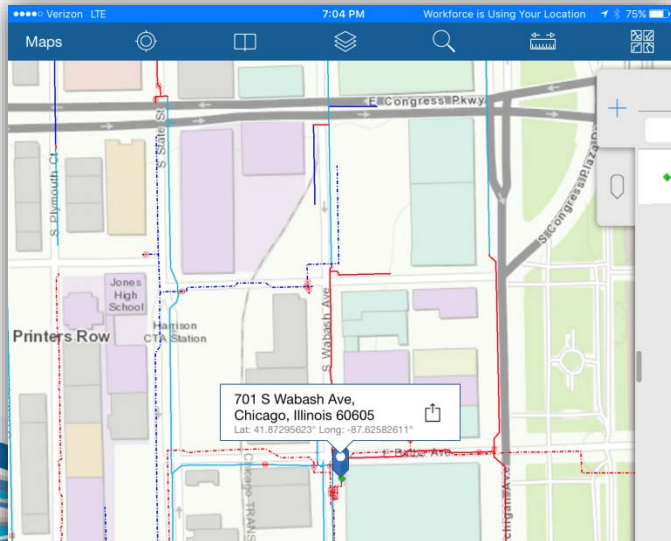


Complete  
Inspection Form



# Workforce: Mobile Worker Workflow

8. Update location, attributes, or attachments
  - Alternatively, launch the vault or maintenance forms



# Workforce: Mobile Worker Workflow

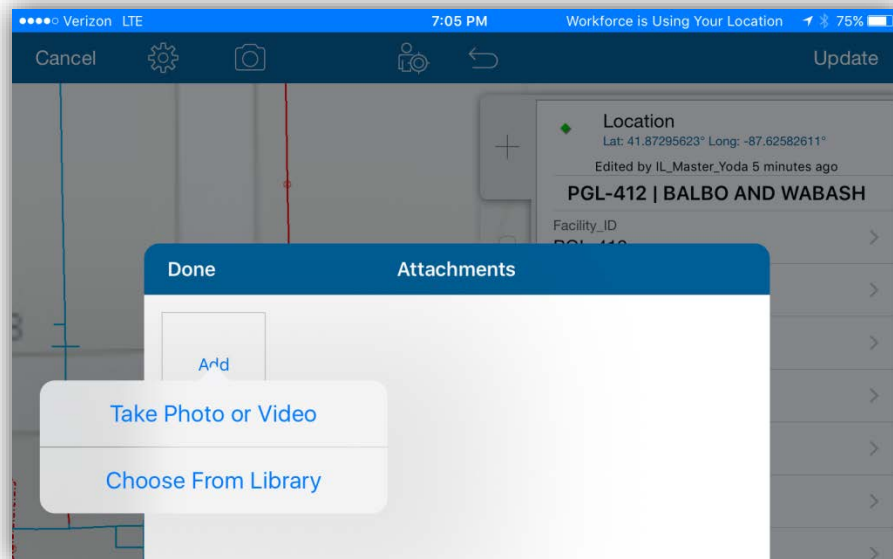
8. Update location, attributes, or attachments

The screenshot shows a mobile application interface for a mobile worker. The top status bar indicates 'Verizon LTE', '7:04 PM', and 'Workforce is Using Your Location'. The app's header bar has 'Cancel', a settings gear, a camera icon, a location pin icon, and an 'Update' button. The main view is a map with a red location pin. A data entry form is overlaid on the right side of the map. The form contains the following fields:

- Location**: Lat: 41.87295623° Long: -87.62582611°  
Edited by IL\_Master\_Yoda 5 minutes ago
- PGL-412 | BALBO AND WABASH**
- Facility\_ID**: PGL-412
- NAME**: BALBO AND WABASH
- RUN**: 12
- CSIZE**: 10
- C\_MANUF**: FISHER
- CMODEL**: 298CKB
- CSERIALNO**: 5630259
- CTRLSPRGC**: SLVR/GRN
- WRKSPRGC**: RED
- PILOTMDLC**: 61LD
- CYEAR**: 1973
- INTRMDPRES**: 10PSIG
- MSIZE**: 10

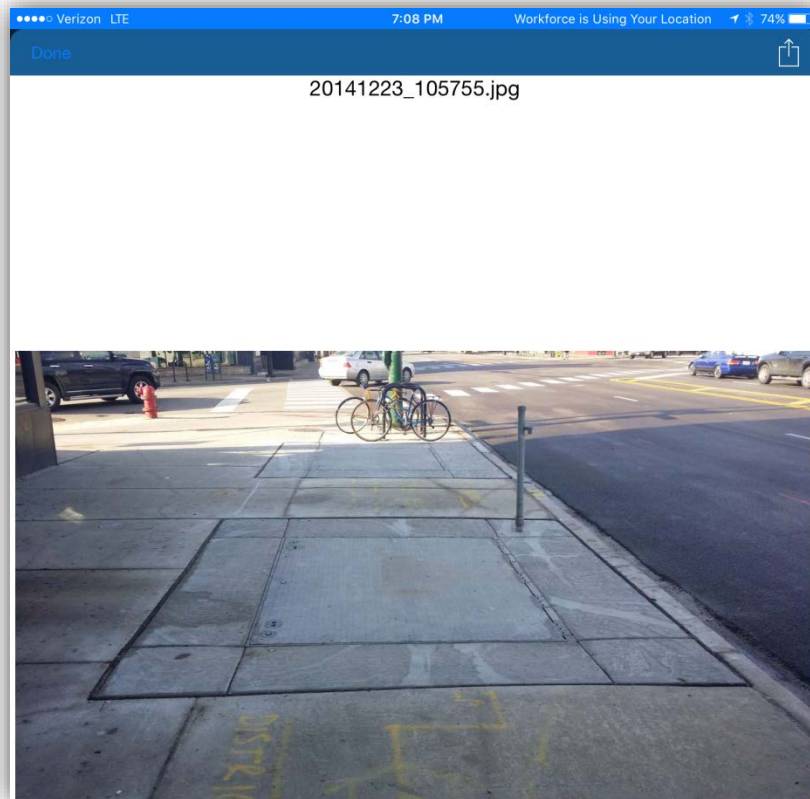
# Workforce: Mobile Worker Workflow

8. Update location, attributes, or attachments



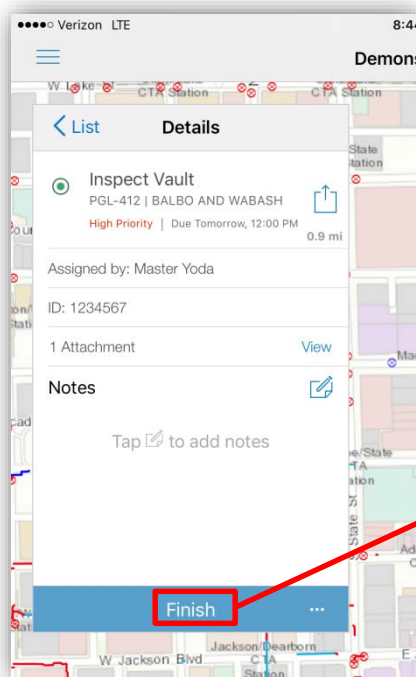
# Workforce: Mobile Worker Workflow

8. Update location, attributes, or attachments



# Workforce: Mobile Worker Workflow

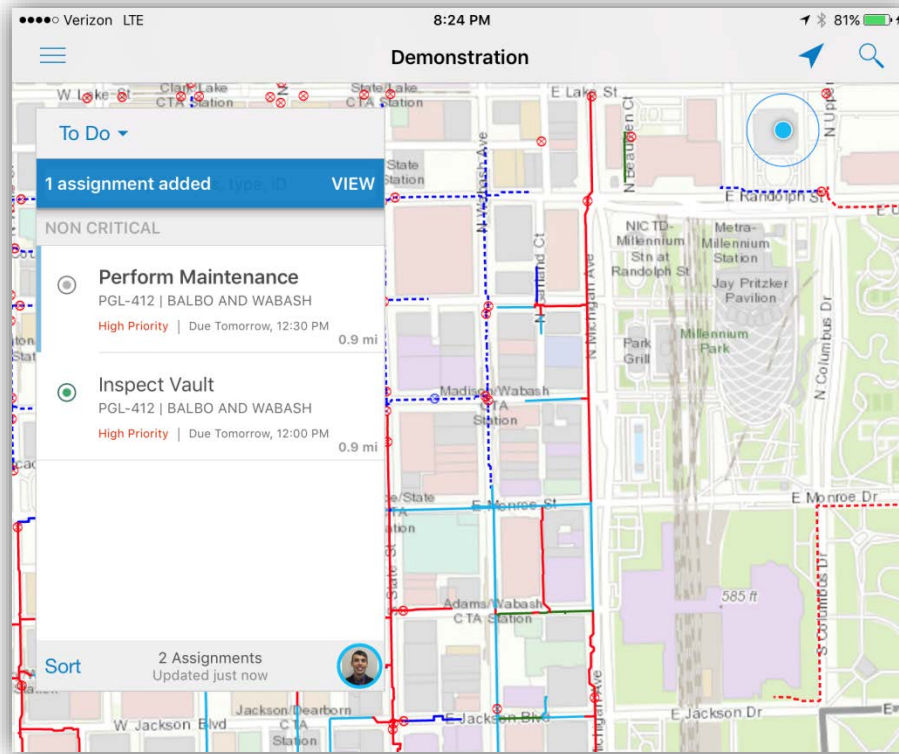
## 9. Finish Assignment





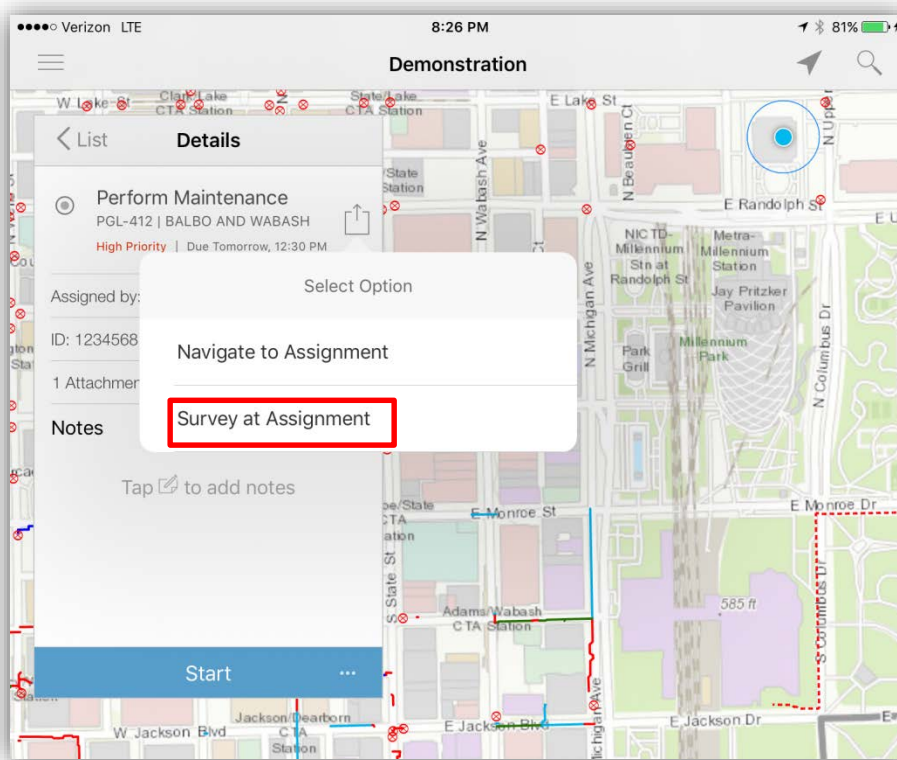
# Workforce: Mobile Worker Workflow

- Maintenance Form



## Workforce: Mobile Worker Workflow

- Different assignment type, different form.





# Workforce: Mobile Worker Workflow

- Different assignment type, different form.

The screenshot displays a mobile application interface for a 'System Operations Maintenance Work Ticket'. The status bar at the top shows 'Verizon LTE', '8:26 PM', and 'Workforce is Using Your Location'. The app header is green with a white 'X' icon and the title 'System Operations Maintenance Work Ticket'. The form fields are as follows:

- Location \***: A map view showing a location in Chicago with coordinates 41°52'N 87°38'W. A red pin is placed on the map near W Congress Pkwy and W Harrison St.
- Work Request Number**: A text input field.
- Employee Information**: A section containing:
  - Prepared By: \***: A dropdown menu labeled 'Choose Name'.
  - Truck #: \***: A text input field.
  - Date of Work: \***: A date picker.
  - Shop: \***: Three radio button options: 'Division Street', 'Crawford Station', and 'South Shop'.
- Repairs**: A section containing:
  - Repair Type: \***: Two checkboxes, 'Regulator' and 'Valve'.
  - Was a Leak Found? \***: Two radio button options, 'Yes' and 'No'.
  - Regulator Repair Type:**: A row of checkboxes: 'AUX-Piping', 'Bypass', 'Inlet Valve', 'Outlet Valve', and 'Diaphragm'.

At the bottom of the screen, there is a green bar with a white checkmark icon on the right. The page number '45' is visible in the bottom left corner.

# Data Review



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# Workforce: Data Review

- Survey123 Web: Analyze and Data Views

## Analyze Tab

Answers	Count	Percentage
Ray Alan Ames   118570	0	0.00%
Micaiah D Barnes   118904	0	0.00%
Steven A Digweed   106942	57	67.86%
Matthew Doucet   115548	11	13.10%
Alonzo J Foster   114826	1	1.19%

## Data Tab

**Vault\_Inspection\_Form (84 features, 1 selected)** Options

Inspector	email	PDC #
MDoucet_PGL	MDoucet@peoplesgasdelivery.com	8
JMPena_PGL	JMPena@peoplesgasdelivery.com	9

**Individual Response**

**PDC #**  
9

**Car #**  
3101

**Supervisor**  
Steven A Digweed | 106942

**Vault Name**

Submitted By: JMPena\_PGL  
Submitted Time: 6/6/17 2:50 PM  
Image Size: ☐ Small ☒ Medium ☐ Large  
Print

Open in Map Viewer Expand Table ☒ Show Individual Response 5/19/17 - 8/25/17 CSV Download

# Hardware & Training

- 25 iPads for field use.
- Pilot with small user group (~3 crew members)
- Several revisions of the forms
- System Operations conducted training

# Planned Improvements

- Convert additional paper forms
- Develop more robust reporting
- Pursue automatic assignment creation via REST API.



Web AppBuilder

# Lessons Learned

1. Pilot with small tech-friendly group and implement feedback quickly.
2. Integrating additional forms into each Workforce Project is seamless.
3. Ability to vary associated Survey123 form and Collector map by assignment type is crucial.
4. Use of Survey123 forms requires very little training for most.

# Future Improvements

## Workforce Functionality Wish List

- Pass attributes from facility to assignment to Survey123 via action button according to the assignment type
- Allow more than 12 results by webmap query
- Enable mobile workers to add attachments to assignments as they complete them
- Consolidation of functions into one application.
- Ability to turn layers on/off within the Workforce mobile app.

*All Are Already Ideas on ArcGIS Ideas website*

# Q&A

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