Basemaps, geocoding, routing and coffee; How GIS improves L&I inspections

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The *Who, what, where, when, why* and *how* the Washington State Department of Labor and Industries uses GIS to improve electrical inspections.
Who is the Washington State Department of Labor of Industries (L&I)?

• ~2,800 employees across 19 offices, within designated six regions in Washington state
• L&I is a diverse state agency dedicated to the safety, health and security of 2.5 million Washington workers and protecting the public from unsafe work and economic hardship.
L&I’s five core goals:

1. Keep Washington safe and working
2. Protecting the health and safety of workers
3. Ensuring medical care and financial help for injured workers
4. Protecting workers' wages, hours, breaks and more
5. Protecting the public from unsafe work and economic hardship
Labor and Industries facts (2015)

• Workers' compensation insurance provided for 174,000 employers and 2.69 million workers.
• Workplace safety and health inspections or consultations: 4,642.
• Unpaid wages collected: $2.8 million.
• Electrical wiring jobs inspected: 214,439.
• Boilers/pressure vessels inspected: 15,721.
• Elevators/conveyances inspected: 6,972.
• New apprentice registrations: 4,900.
The *where* of Labor and Industries

One state, 39 counties, 19 offices, six regions

https://lni.maps.arcgis.com/home/webmap/viewer.html?webmap=fd557118ceb3464d88c595771d3351eb
The *why* of L&I using a mobile application for electrical inspections

- Previous inspection application was outdated and experienced offline issues
- Drive to improve customer satisfaction by completing inspections faster; construction projects finish sooner
- Optimized routing and enhanced trip planning will save time, allowing for more effective inspections
- L&I performs over 195,000 inspections annually… that’s a lot of inspections! And we are working to improve efficiency whenever we can
The what of L&I’s mobile application

Developed a mobile application integrating both laptop and mobile devices, that allows for electrical inspectors to more efficiently perform their daily work duties using the strength of GIS services.

- The process begins with geocoding address locations for electrical inspection.
- All addresses are stored in SQL databases and geocoded using the Washington Master Address Service (WAMAS) and Esri geocoders.
More *what* of the mobile application

- Displays the geocoded inspection locations on a custom basemap, that includes 2016R3 Street Map Premium road data
- Allows for supervisors to select inspection addresses for electrical inspectors
- Creates optimized routes for selected locations assigned to each inspector
- Displays inspection locations and optimized routes on inspector laptops
And some more *what* of mobile

- Exports route and locations to Esri Navigator for turn by turn directions
- Inspectors can adjust or reorder (or delete) any inspection locations based on work schedule and responsibilities to improve routing
- *We will focus on the GIS functions of the mobile application instead of the whole of the application*
Want more details?!?

Okay, I’ll relent and provide some details!

• Our application interfaces with SQL databases and GIS services. It is linked to individual inspectors via user ID; it allows for more freedom and creativity
• Our application is designed to support users in both a connected and disconnected state, using online and offline maps
• Optimized routes and inspection locations are displayed on both laptops and in Navigator (via web link)
So *what* does it look like: custom basemaps?

- **Bluescale basemap**
- **Greyscale basemap**
The Esri basemap and custom layers
Adjusting routing layer properties

- It is necessary to adjust routing settings to account for travel conditions
- Inspectors may have to use ferries, travel unpaved roads and private roads, etc.
Routing the inspections

Routing

You can manually enter route order here. You cannot enter duplicate numbers.

Selecting Auto Route will let the system choose the best route.

Once routed, the map will display a green route.

The purple icons represent the start and end address you created in Settings.
Routing on the Navigator app

- Navigator routing is set to optimize routes based on travel time
- The locations and route are uploaded to Navigator via web link, with multiple locations
- Inspectors can edit or rearrange and delete stops to optimize a route during the course of work
The *how* of using Navigator

Using the Navigator Application

Open the mobile inspection app by selecting this icon.

You will be prompted to login the first time, but if you select “Remember me” you will not have to log in in the future.

Select the Route icon to open Navigator.

Click on the 🗺️ icon and a map with your route is displayed.

Using the Navigator Application

Select “Edit” to make changes to your route.

Select Start Navigation to begin navigating.

Re-order your route

Hold and drag to move the location.

Delete a stop

Swipe left to open the Delete option. Select Delete to remove the request.
The process from form submission to inspection
The *when* of L&I’s mobile inspections

- Our application was legislatively mandated for the electrical program funded for 2015-17
- All of our development was done in-house with L&I programmers and contracted developers
- Development began in November ‘15 and concluded June ‘17
- The mobile application is used by approximately 200 electrical inspection personnel *daily*!
- L&I plans to use the mobile inspection application into the foreseeable future
More *when* of L&I’s mobile inspections

- Application version releases will occur on a bi-annual basis
- The application was developed as Esri released its vector tile basemaps; they will be integrated into future releases
- Navigator basemaps will be customized and enhanced with state road data
- Can’t forget to renew those Navigator licenses annually!
Major Project Issues/Risks

• Having users adopt a new method to perform their work
• Older than average user base (somewhat resistant to change)
• Integrating business requirements vs. user wants
• Number of application users ~200
• By not improving the “old app” the efficiency and customer service of inspectors could be jeopardized by using out of date data
The next steps forward

- Submitting a list of suggestions for Navigator improvements
- Will incorporate custom Navigator maps for low light use
- Use vector tile basemaps (laptop feature of mobile inspection app) in future releases
- Will update and expand roads network using Washington Department of Transportation (WSDOT) roads
Questions?

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