

# Efficiency Compounded

HOW PORTLAND USED A SIMPLE GIS APP TO  
COORDINATE A MULTI-MILLION DOLLAR, CITYWIDE  
LED CONVERSION

**Dan Spoelstra**, Engineering Associate

# The Journey

- LED Luminaires – A recommended practice(?)
- GIS – A life-saving acronym
- Collector for ArcGIS – App-etizing
- Public Transparency – Avoiding pitfalls
- Other apps for the app
- Is the “Portland Method” good for you?

# The Emergence of LED Luminaires

- Early 2000s, LEDs used in street lighting application
  - 2007 – Raleigh, NC – First municipality to utilize LEDs for street lighting.
- By 2013, large-scale conversions in Seattle, Los Angeles, Phoenix
  - Proving that LED technology is suitable for roadway lighting
  - City of Portland begins sample LED conversion
- Summer 2014 – Portland began one of the largest energy efficiency based projects in history with aggressive cobrahead LED conversion
- How did we get off the ground?

# What do we have?

- Existing GIS layer for street lights
  - Location
  - Asset ID / Map and Pole Number
  - Luminaire Description
  - Owner / Maintainer
- How can we use this info during conversion?
- What other data do we need?
- How can we use this existing information system to our advantage?

## ARCGIS – STREET LIGHTS



# GIS and YOU!

- A contractor, an engineer, and an accountant walk into a bar...
- Need for user interface that can produce a usable output
  - Who are the end users? Is there an end user?
- Out with old, in with the new
  - Trimbles
  - iPads (or any mobile smart device)
- Collector for ArcGIS, by ESRI

# App-etite for Conversion

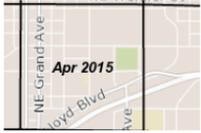
LET'S EXPLORE THE APP...



All

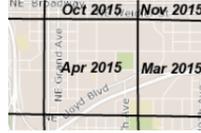
On Device

3 maps



PBOT Street Light Replacement

4/28/15 | Mike Quetel



Option C Street Lights

4/28/15 | Mike Quetel

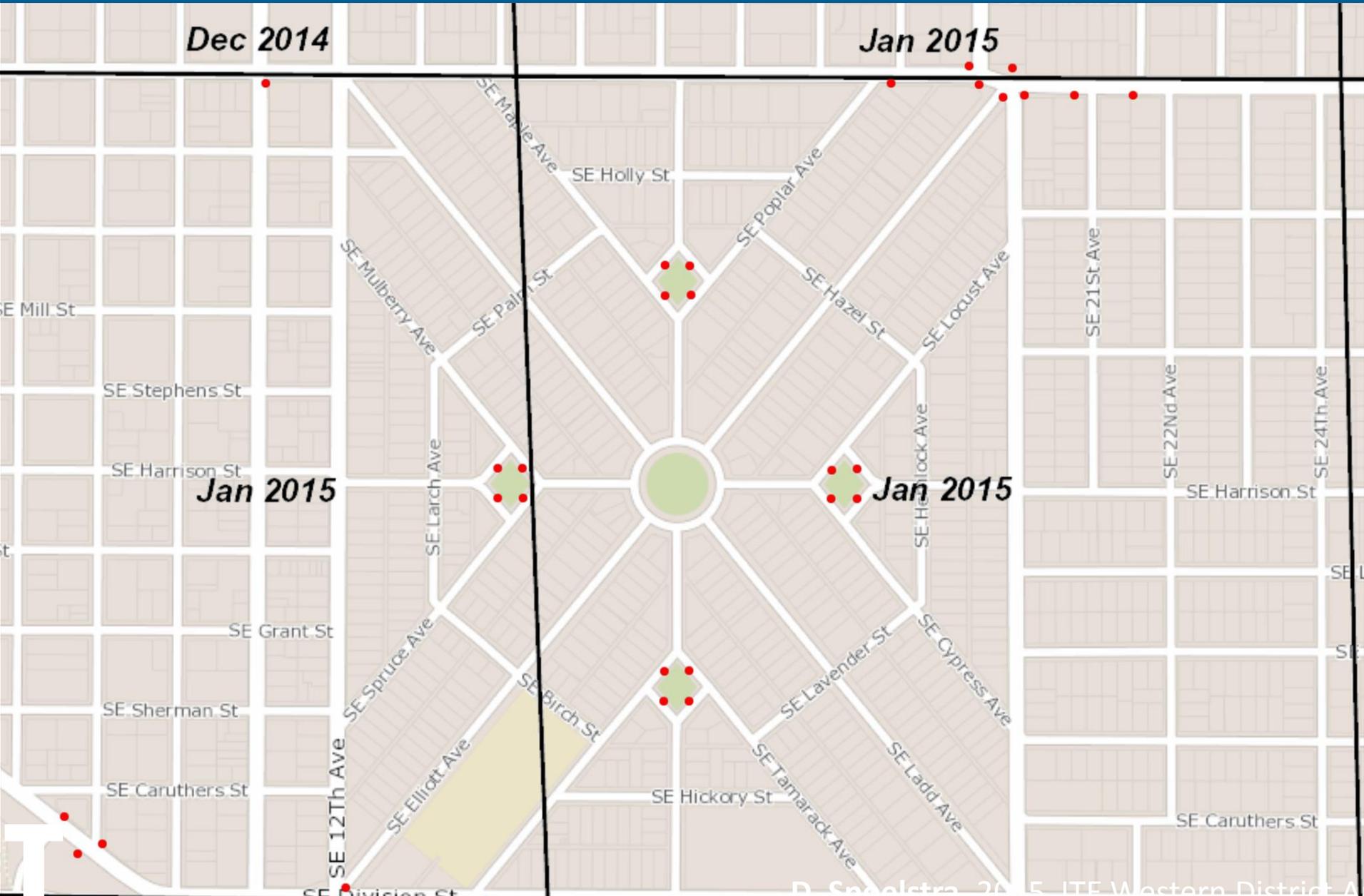


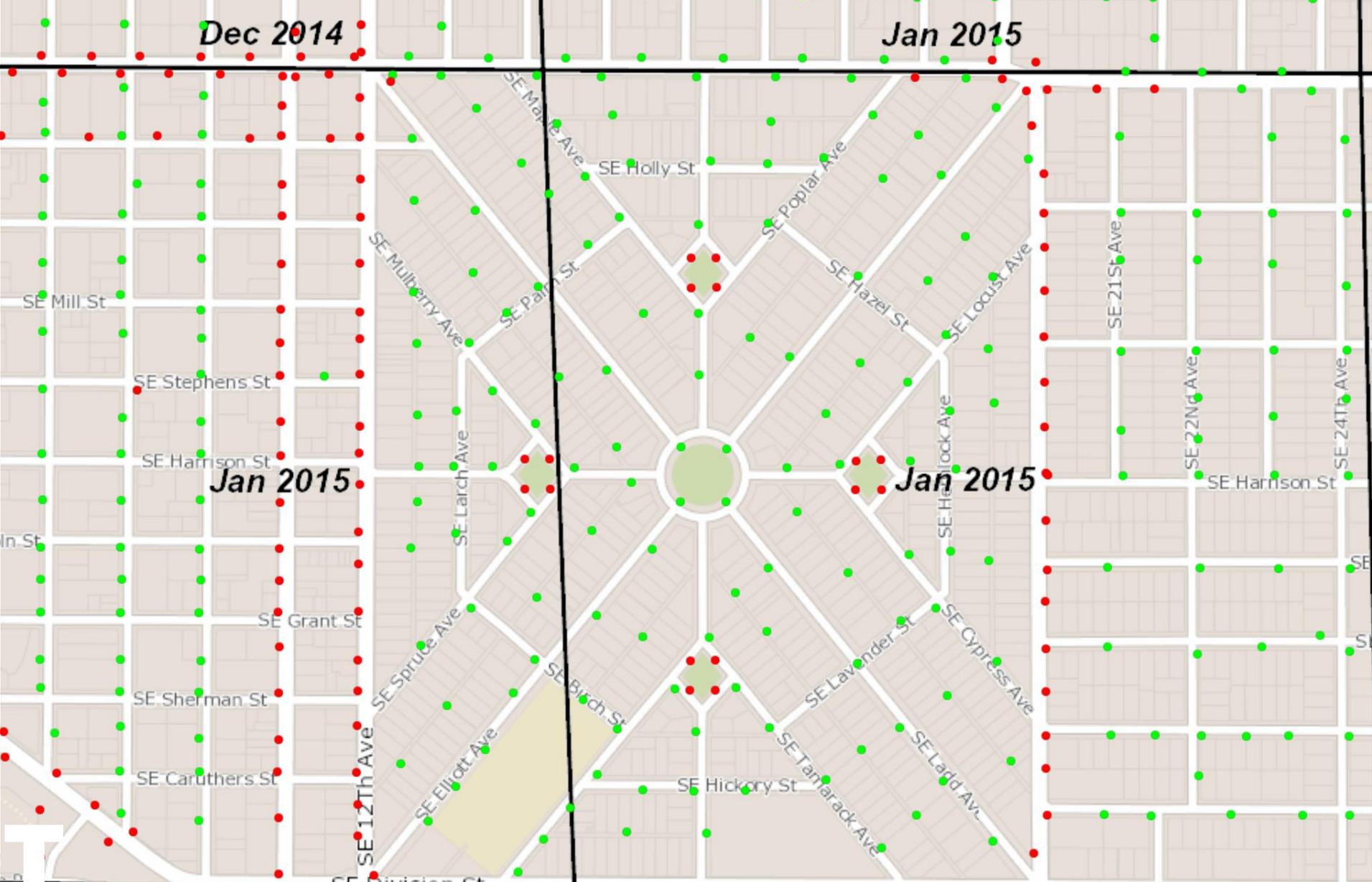
Option B Street Lights

4/28/15 | Mike Quetel

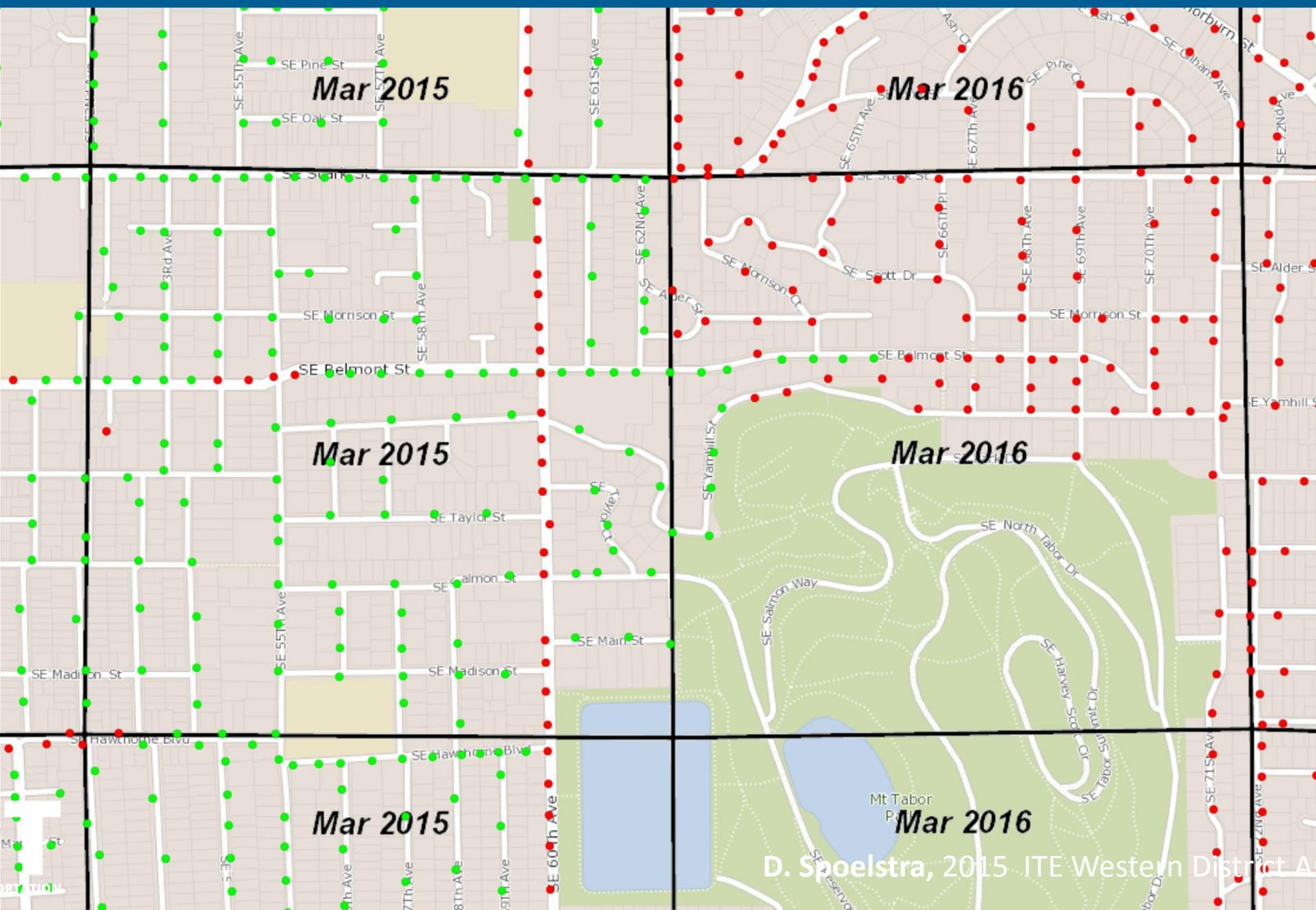


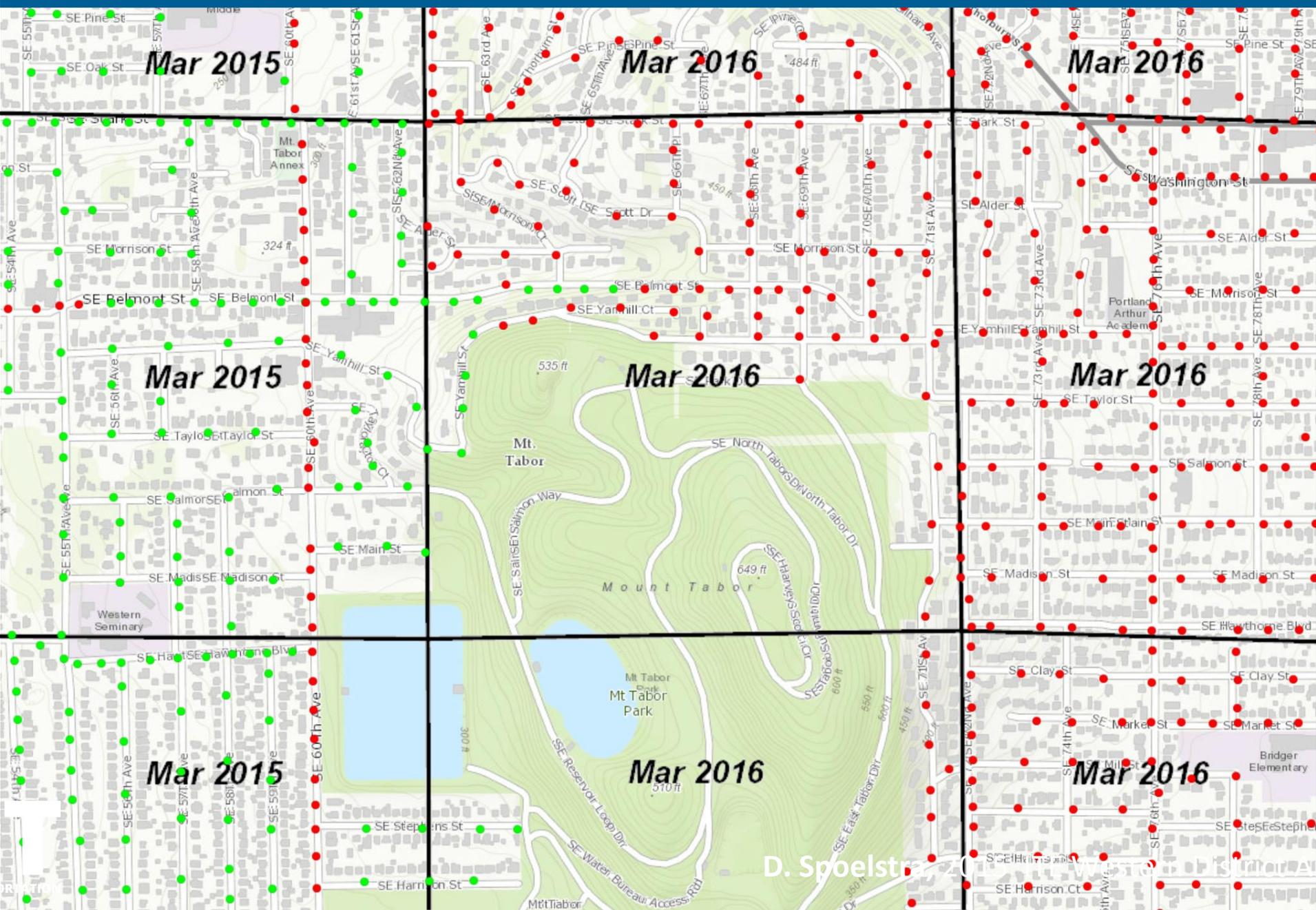


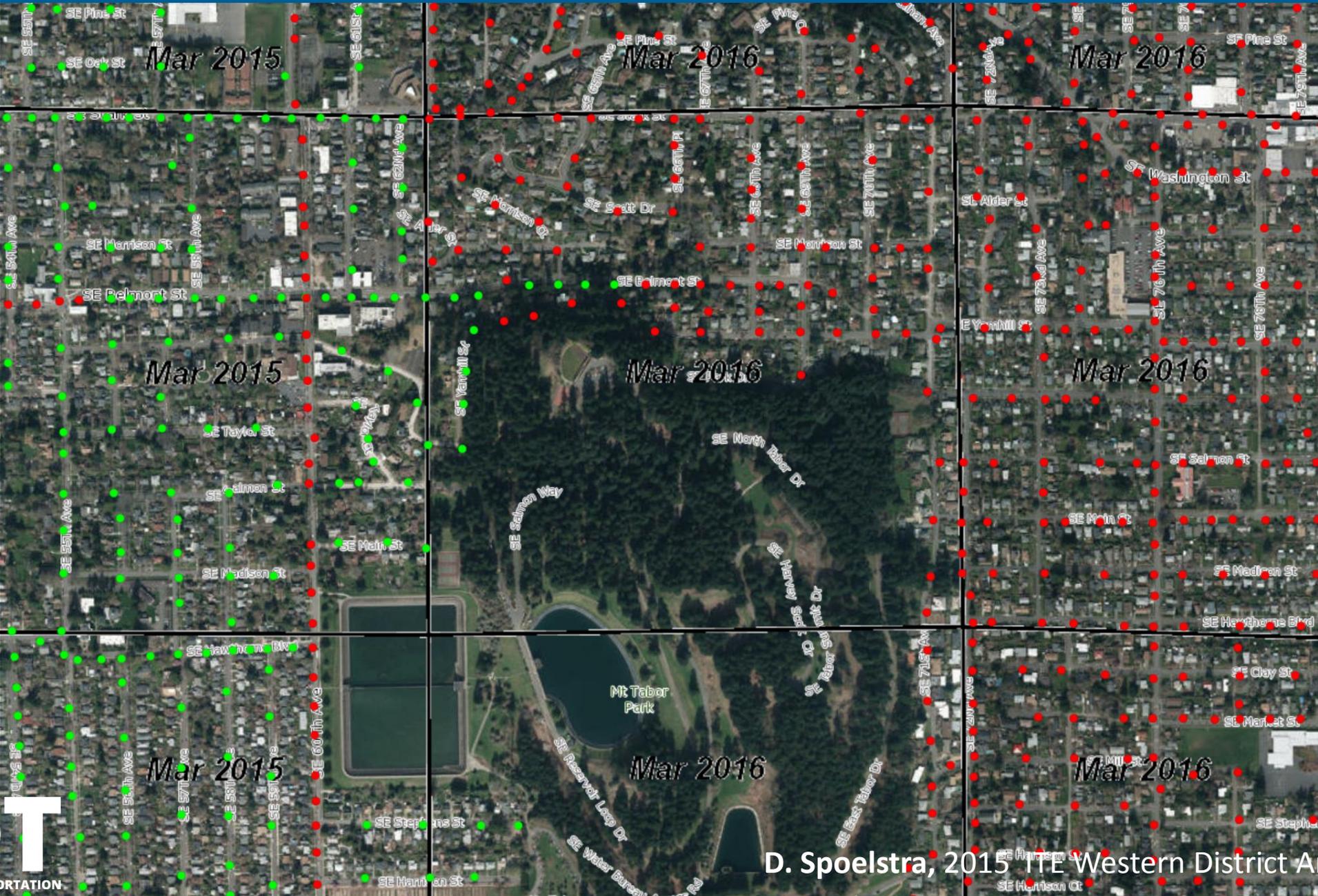


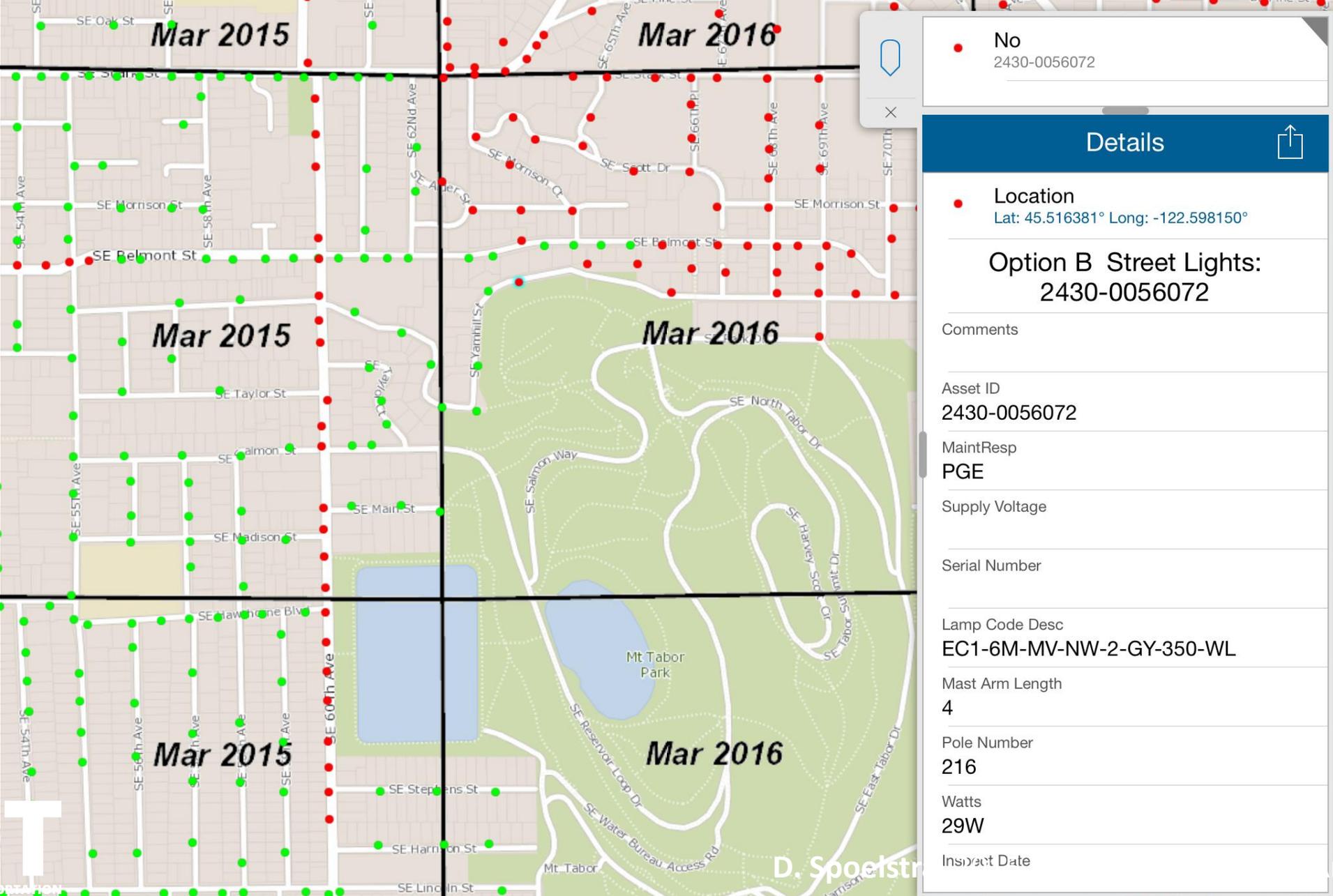












No  
2430-0056072

**Details**

**Location**  
Lat: 45.516381° Long: -122.598150°

**Option B Street Lights:**  
2430-0056072

Comments

Asset ID  
2430-0056072

MaintResp  
PGE

Supply Voltage

Serial Number

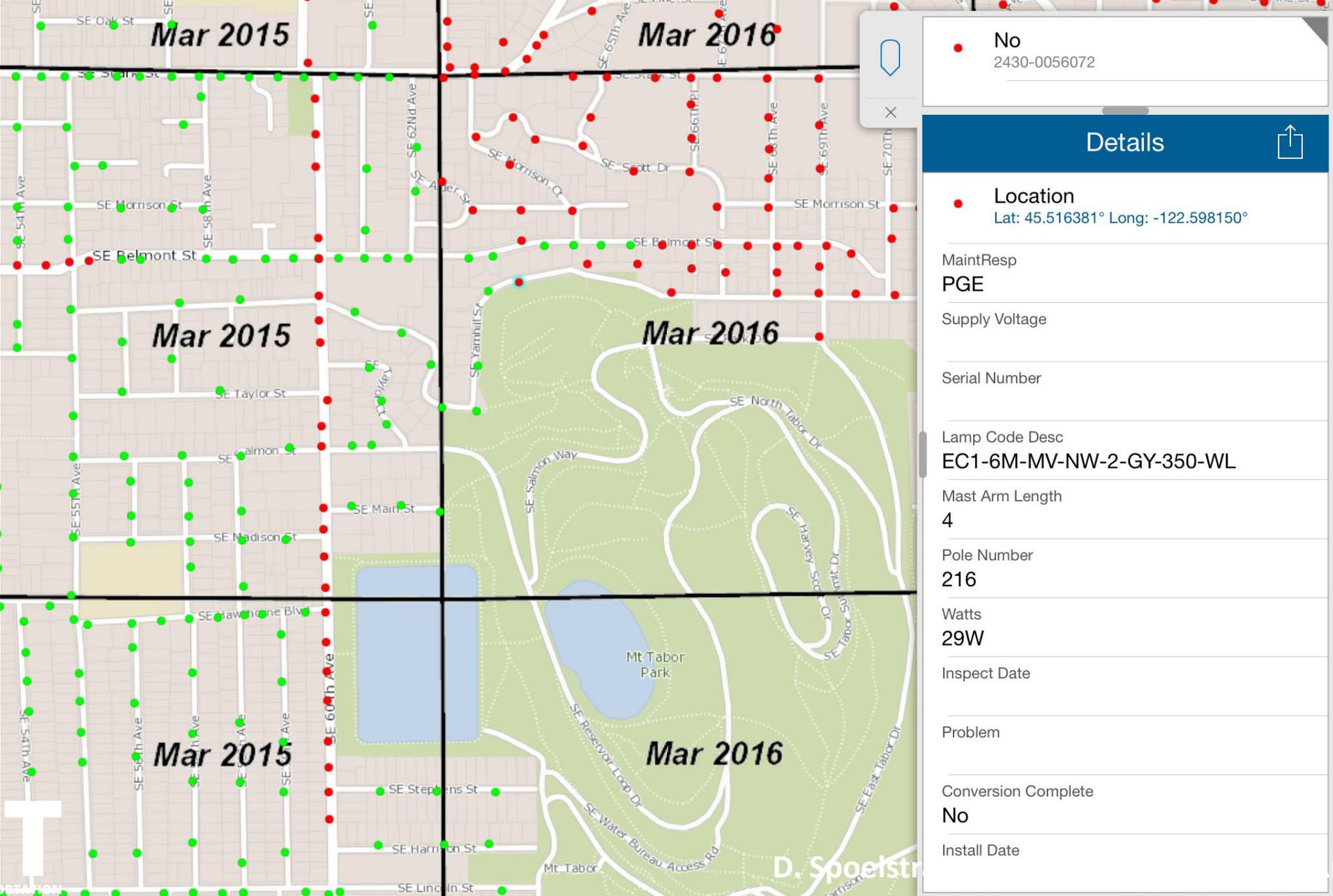
Lamp Code Desc  
EC1-6M-MV-NW-2-GY-350-WL

Mast Arm Length  
4

Pole Number  
216

Watts  
29W

Inspect Date



**No**  
2430-0056072

**Details**

**Location**  
Lat: 45.516381° Long: -122.598150°

MaintResp  
**PGE**

Supply Voltage

Serial Number

Lamp Code Desc  
**EC1-6M-MV-NW-2-GY-350-WL**

Mast Arm Length  
**4**

Pole Number  
**216**

Watts  
**29W**

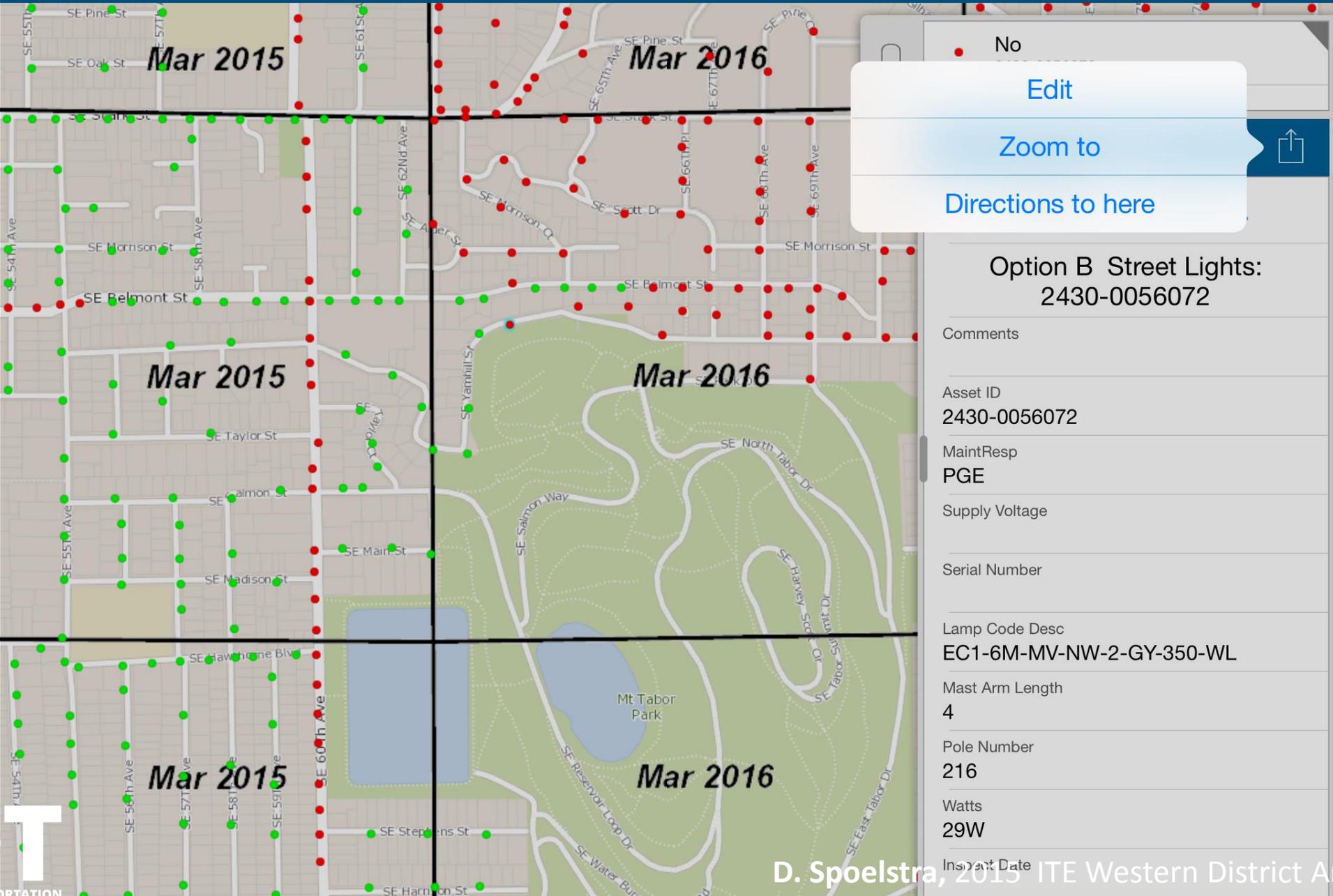
Inspect Date

Problem

Conversion Complete  
**No**

Install Date

Maps



No

Edit

Zoom to

Directions to here

Option B Street Lights:  
2430-0056072

Comments

Asset ID  
2430-0056072

MaintResp  
PGE

Supply Voltage

Serial Number

Lamp Code Desc  
EC1-6M-MV-NW-2-GY-350-WL

Mast Arm Length  
4

Pole Number  
216

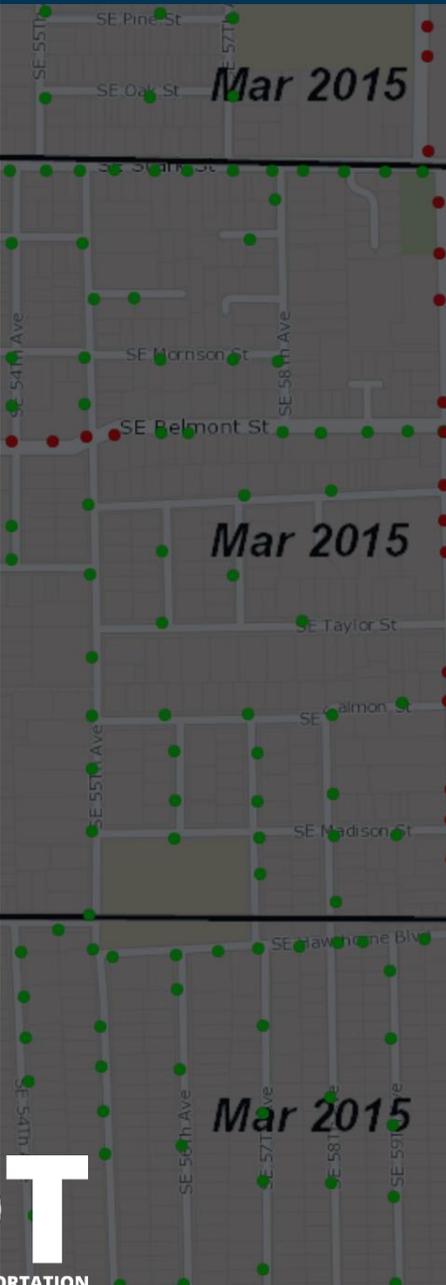
Watts  
29W

Install Date

Cancel



Update



Cancel Done

Inspect Date

March	21	2012
April	22	2013
May	23	2014
<b>June</b>	<b>24</b>	<b>2015</b>
July	25	2016
August	26	2017
September	27	2018

Today

Location  
45.516381° Long: -122.598150°

Option B Street Lights:  
2430-0056072

Stage

ber

length

te

Complete

Cancel



Update

Cancel

Done

Problem

Tree/Veg Obstruction

NESC Violation

Missing Light

Traffic Control

Damage

No Power

Cycling

Dim

Lens

On

Out

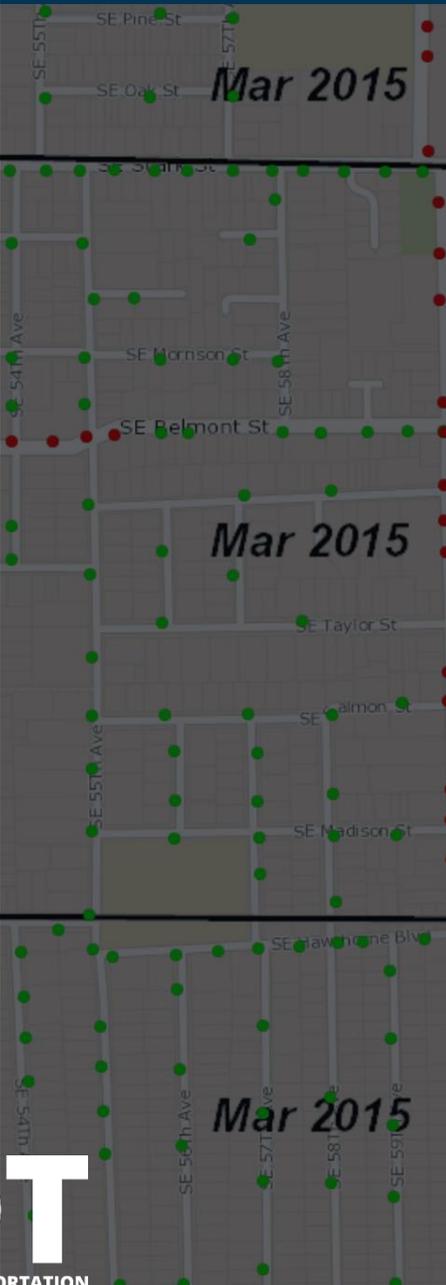
Other

None

Cancel



Update



Cancel Done

Install Date

March	21	2012
April	22	2013
May	23	2014
June	24	2015
July	25	2016
August	26	2017
September	27	2018

Today

Location  
45.516381° Long: -122.598150°

Option B Street Lights:  
2430-0056072

Stage

ber

length

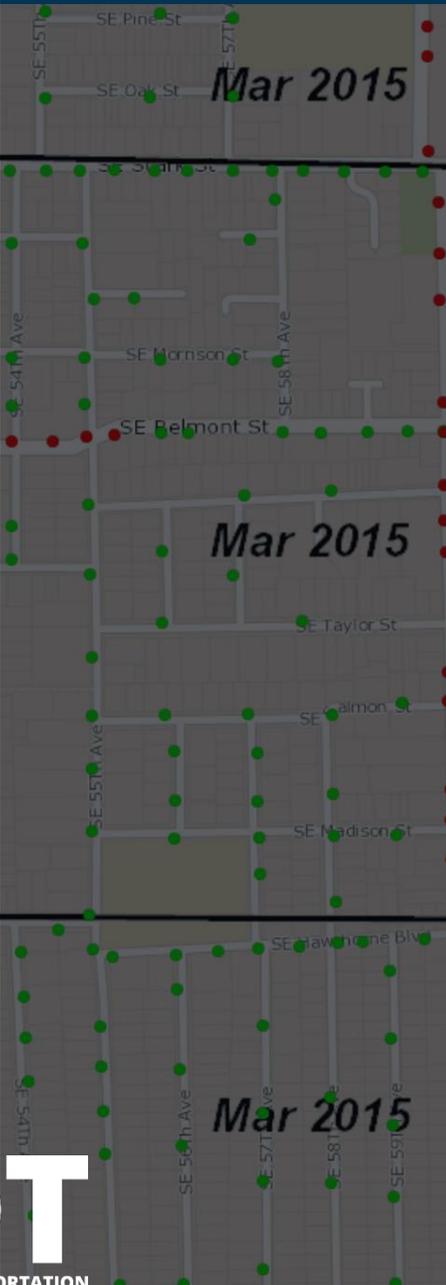
te

Complete

Cancel



Update



Cancel Done

Conversion Complete

---

<No value>

---

No

---

Yes

Location	45.516381° Long: -122.598150°
Option B Street Lights:	2430-0056072
Page	>
ber	>
length	>
te	>
Complete	>

Cancel  Update

Comments

0/255 

SE Pine St  
SE Oak St  
SE 54th Ave  
SE Morrison St  
SE Belmont St  
SE 58th Ave

Mar 2015

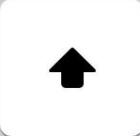
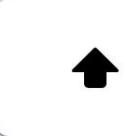
location  
45.516381° Long: -122.598150°  
Option B Street Lights:  
2430-0056072

age  
ber  
length

I The I'm

Q W E R T Y U I O P 

A S D F G H J K L return

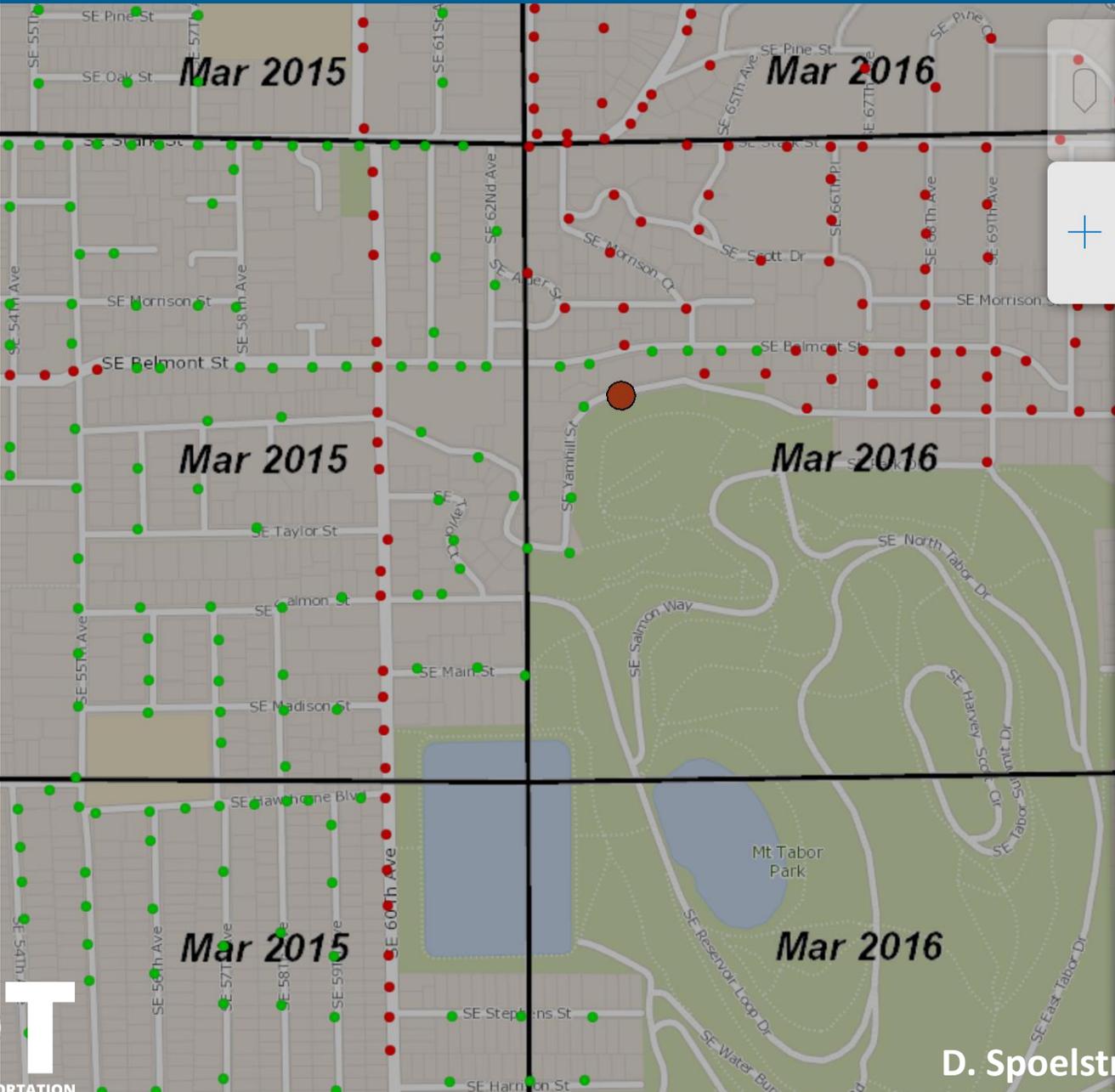
 Z X C V B N M ! , ? . 

Cancel



Update



**Location**  
Lat: 45.516381° Long: -122.598150°

**Option B Street Lights:  
2430-0056072**

Comments >

Supply Voltage >

Serial Number >

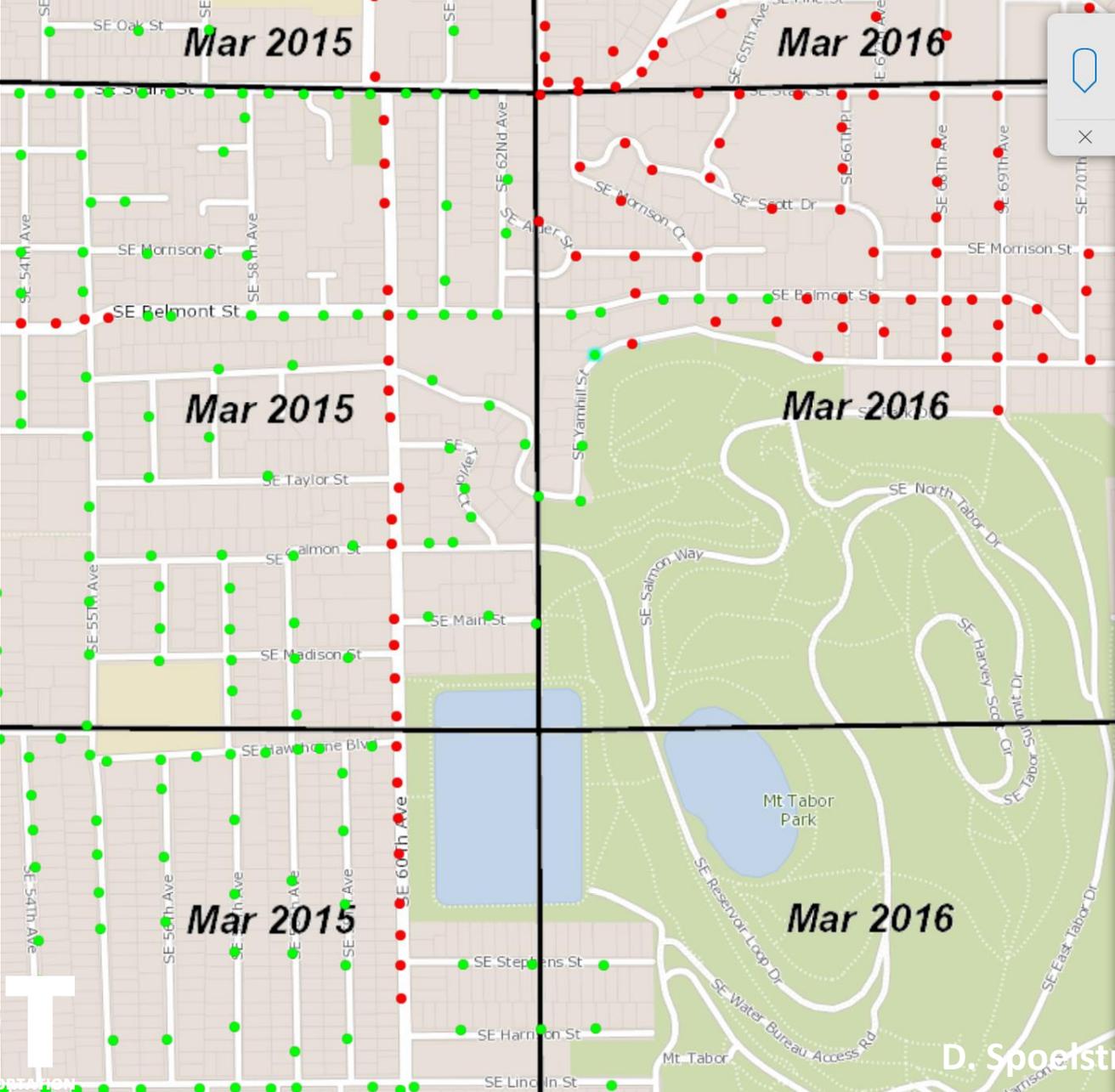
Mast Arm Length  
4 >

Inspect Date >

Problem >

Conversion Complete  
**No** >

Install Date >



Yes  
2430-0056071

**Details**

**Location**  
Lat: 45.516253° Long: -122.598743°

MaintResp  
**PGE**

Supply Voltage  
**120V**

Serial Number  
**15202604**

Lamp Code Desc  
**EC1-6M-MV-NW-2-GY-350-WL**

Mast Arm Length  
**4**

Pole Number  
**212**

Watts  
**29W**

Inspect Date

Problem

Conversion Complete  
**Yes**

Install Date  
**February 23, 2015**

# Initial Impressions: Best. Investment. Ever.

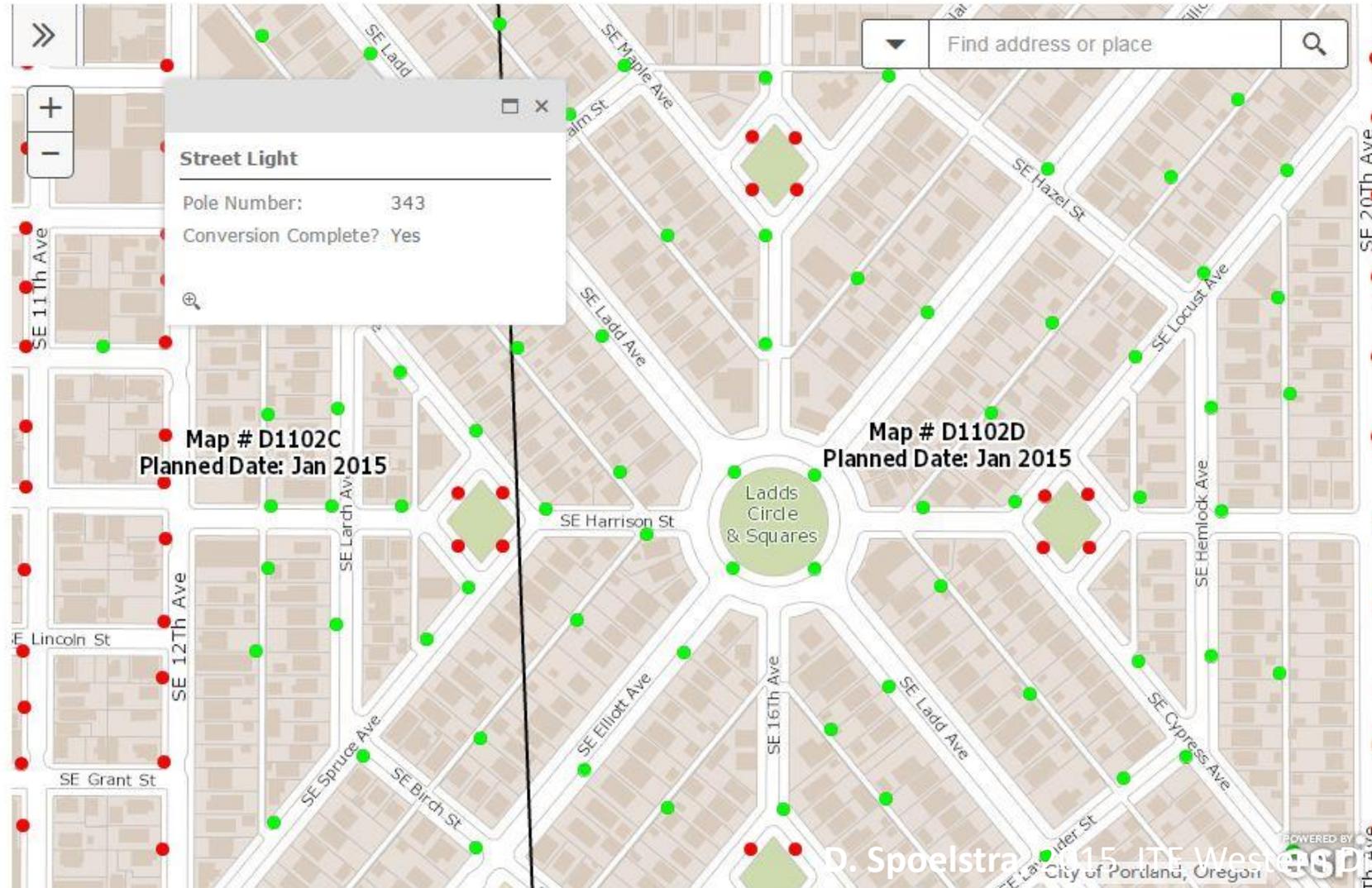
- Live feedback: Monitoring your dollars at work
- Limitations of Collector – Keep the training wheels on
  - Purposefully limit which features can be edited
  - Intentionally create redundant layer specifically for conversion, separate from GIS Street Lighting layer (assets)
- Cellular coverage – Updates to GIS server can become delayed or unresponsive if limited data service available
- Bluetooth Serial Code Scanner – Important for Warranty
- Our maps are only as accurate as our records

# COMMENTS – The most useful feature

- Useful tool for communications between field and office.
- Equally as important – Avenue of Humor
  - “Semi buried. (Removed semi from tree and informed driver that city ordinance forbids trucks from stopping in trees unless marked as a loading zone.)”
  - “Radioactive mutant spiders of doom live here.”
  - “Created by the Street Light Import Tool [Trimble]. (Converted by the apprentice lineman tool.)”
  - “Could not find this pole or light anywhere. It must be covered with the cloak of invisibility or Sasquatch ripped it down because he hates streetlights in the middle of the woods.”
  - “Mmmmmmmmm.....”

# Public Transparency

- PBOT has webpage dedicated to LED conversion, complete with FAQ section, design standards, and more.
- Live online map, mirroring GIS conversion layer
  - Shows conversion schedule based on quarter-sections
  - Limited to cobrahead, NESC conversion – “Phase 1”
  - Lights have pole number, along with quarter-section map number
  - Residents can use this information to provide comments aimed at a specific light location



## LED Street Light Conversion Program

Questions and comments related to The City of Portland's Street Light Conversion Program are welcome. To help us identify the correct Street Light, please provide the Map and Pole numbers, as well as the address nearest to the Street light.

### Map/Pole Numbers

Map and Pole numbers can either be found on the Map above or on the Pole Tag. A Pole Tag is a three inch round metal plate on the Street Light pole located at about eye level (NOTE: Pole numbers will appear as map is zoomed in. There may not be a Pole Tag).

Map #

Pole #

Address Nearest to Street Light\*

Verify Location

e.g. 1120 SW 5TH or 5TH AND MAIN or 100-200 5TH

Questions/Comments\*

Your Name\*

Your Email Address

Your Day Time Phone #\*

Call Back Requested

Picture  No file chosen  
(Maximum file size: 30MB)

\* Required Field

# One App to Rule them All...

- What else could we do with this mobile interface?
  - Electrical Staff Request: Additional features – conduit, service panel location
- Thinking beyond LED conversion – Maintenance Response
  - Tracking repairs via inspection date, problem, and comments fields.
  - LED failures – replaced with new fixture, scan new serial number, updated installation date.
    - If not LED failure, comment field used to provide description. (ex: service connection).
- Field Checks – provide notes from night drives, etc.

# Ornamental Light Pole Survey

- A recognized need for refurbishing ornamental light poles.
  - We know where our poles are.
  - We don't know what kind of shape they are in (paint, damage, tagged, etc.)
- Use existing resources to create the framework for the project.
  - Use the existing street light layer in GIS, filter for lamp code that correlates to ornamental fixtures, and publish new map to GIS server online.
  - The new map is shared with selected users (fellow employees).
  - Make editable features that include condition rating, comments, inspection date, and anything else you want to know about the asset.
- Hit the streets!

Ornamental Street Lights

pdx.maps.arcgis.com/home/webmap/viewer.html?webmap=3b76a78e17044171927989219e5fd916

HOME Ornamental Street Lights

New Map Create Presentation Joe

Details Add Edit Basemap Analysis Save Share Print Directions Measure Bookmarks Find address or place

About Content Legend

Contents

- ornamental type ha
- OrnamentalStreetLights
- Basemap Color Complete

**Ornamental Poles: Some chipping at base. Tilon**

PoleNumber	402000658
PGEMap	D1103B2
AssetID	2430-0039225
Rating	3 - Needs Minor Work
Comments	Some chipping at base. Tilon
InspectDate	July 13, 2015
InspectionComplete	Yes
Edited by neilson on Monday at 3:18 PM	
<a href="#">Zoom to</a> <a href="#">Get Directions</a> <a href="#">Edit</a>	

0 50 100ft

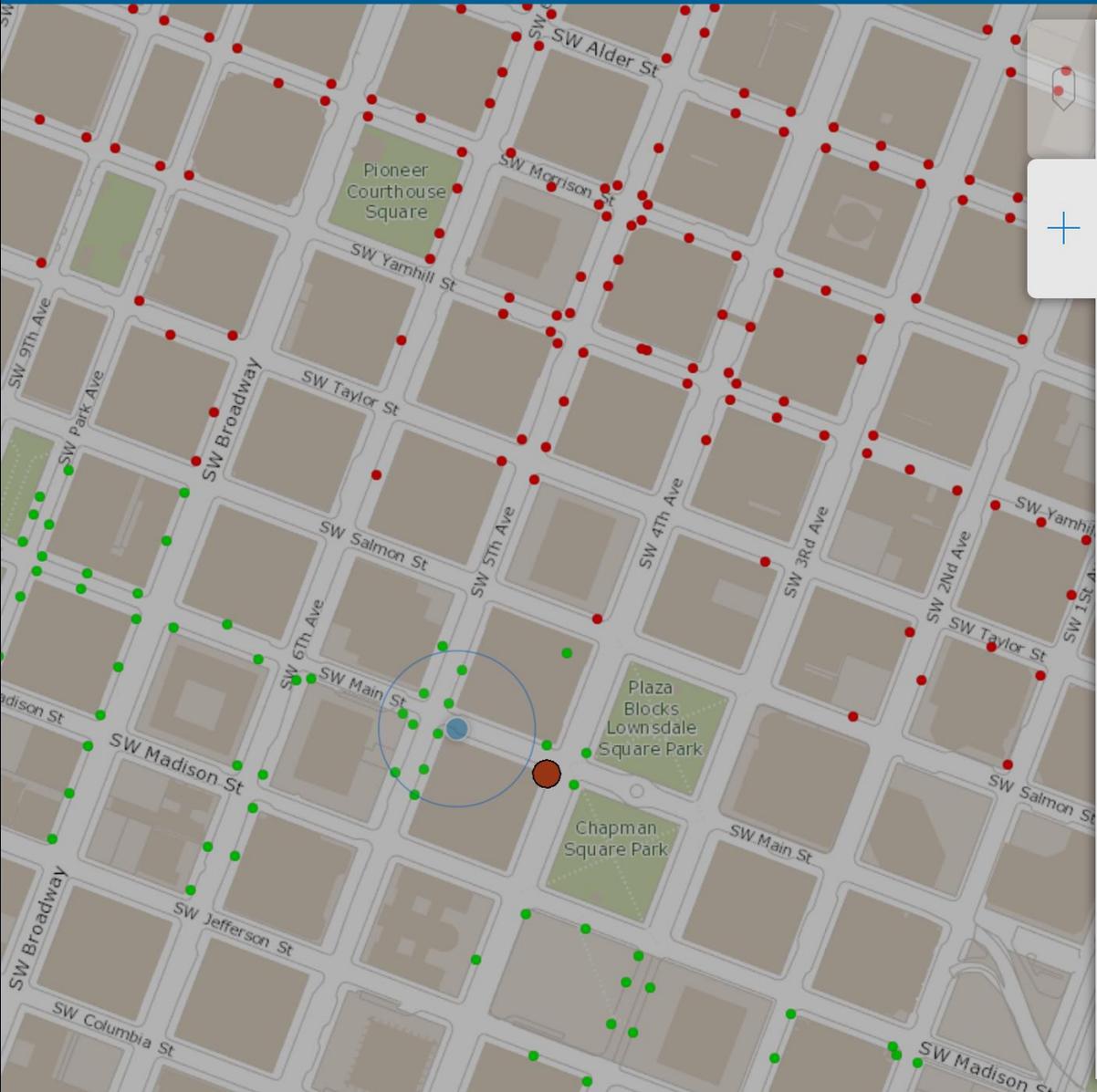
City of Portland, Oregon

POWERED BY esri



Verizon LTE 2:12 PM 100%

Cancel  Update



**Location**  
 Lat: 45.515820° Long: -122.678162°  
 Edited by neilson on Monday at 3:10 PM

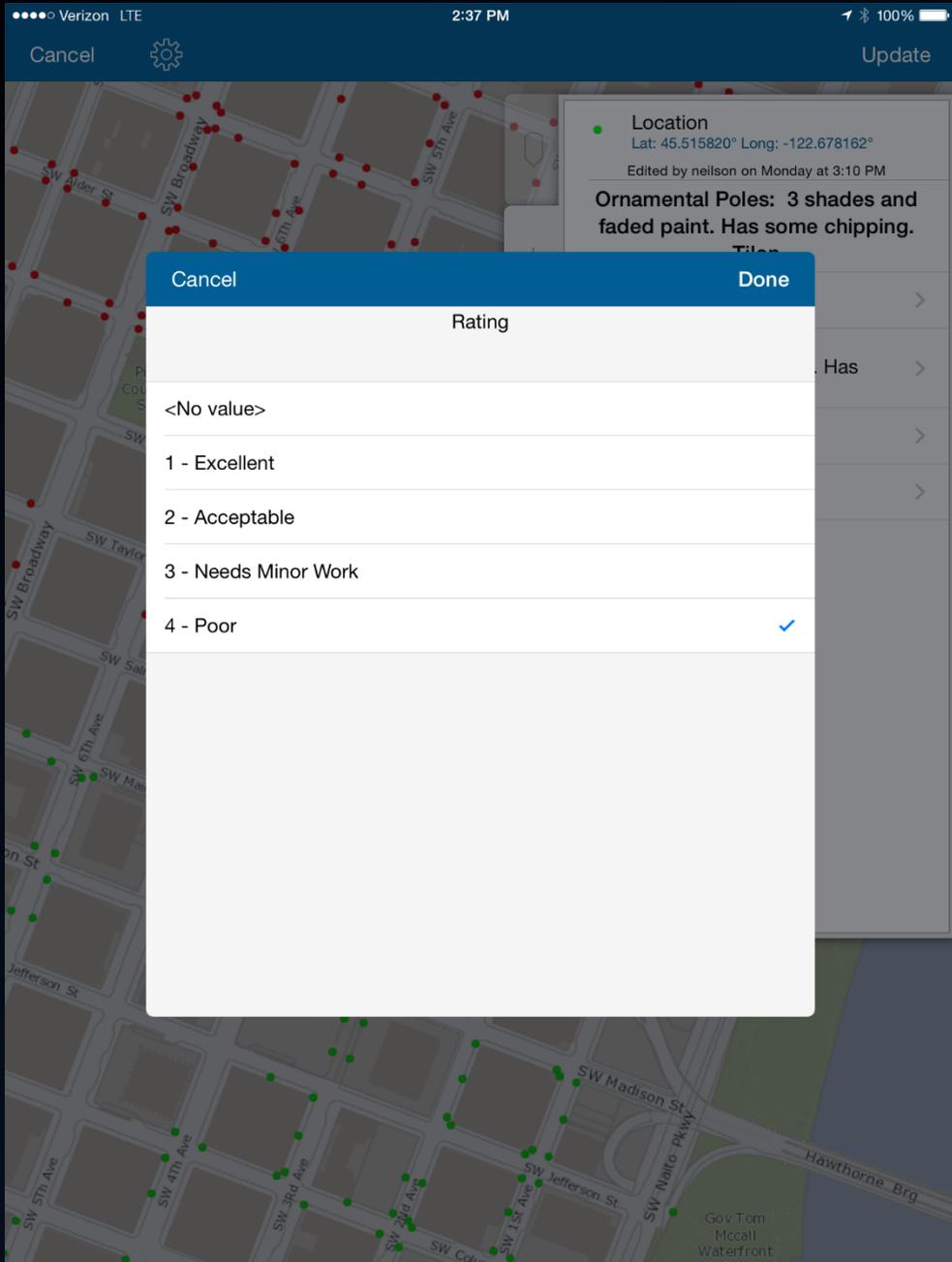
**Ornamental Poles: 3 shades and faded paint. Has some chipping. Tilon**

Rating  
4 - Poor

Comments  
3 shades and faded paint. Has some chipping. Tilon

InspectDate  
July 13, 2015

InspectionComplete  
Yes



# You Can Do It!

- Regardless of size, if you use GIS, you can use the “Portland Method”
- Things you’ll need:
  - GIS Technician (or someone comfortable with creating and managing layers)
  - Mobile Smart Device – iPad, iPad mini, Android Tablet, equivalent
  - Optional (recommended) – Bluetooth barcode scanner
    - We selected a Socket Mobile CHS – excels in outdoor applications
    - Barcode scanner eliminates potential errors when entering serial number
  - Collector for ArcGIS – Upload maps online – Plug and play

## It just makes sense.

- In trying to eliminate paper records during this project, the efficiency of cost savings and resourcefulness is compounded each time a light is converted.
- “Self-audit” – Contractors look at every light
  - Verify location accuracy, identify missing lights
  - Provide information on necessary repairs
- Large scale projects rely on team effort
- Fun Fact: 8 lights have been converted during this discussion

# Thanks!

