

# Advancements in Automatic Vehicle Location (AVL) Technology



# What is AVL

- ❖ Automatic Vehicle Location (AVL)- is the means to automatically transmit data real-time via cellular connected sensors installed on a piece of equipment.
- ❖ AVL not only tracks equipment locations, but also has the capability's to provide data on
  - ❖ Fuel consumption
  - ❖ Idle time
  - ❖ Auxillary inputs
    - ❖ Plow sensors
    - ❖ Salt sensors
    - ❖ Engine diagnostics



# Benefits

- ❖ Historic comparisons
- ❖ Monitoring – allows managers and field staff to see picture of entire fleet
- ❖ Improved response time
- ❖ Better informed decisions
- ❖ Snow removal – when was a street last plowed or salted
- ❖ Billing – accurate accounting showing how long staff were at a site and what they were doing
- ❖ Accountability – hitting mail boxes, driving too fast, idle time, ect.
- ❖ Engine Diagnostics
- ❖ Sky's the limit

# Fishers Requirements for AVL

- ❖ City to own the data
- ❖ Track all DPW mobile equipment
- ❖ Flexible reporting
- ❖ Intuitive
- ❖ Real time two way information
- ❖ Monitor
  - ❖ Speed
  - ❖ Location
  - ❖ Breadcrumb trail
  - ❖ Plow/spinner status



# How AVL Works

Data:

- Position
- Speed
- Alerts



Dashboard:

- Position
- Speed
- Alerts
- Reporting
- Geofencing
- Analysis

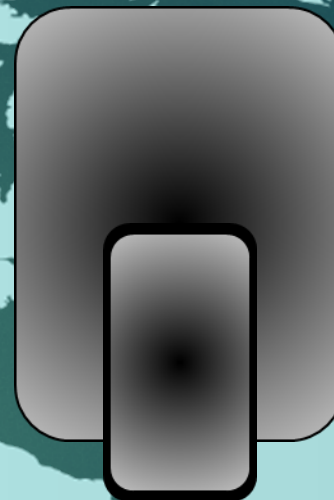


Device



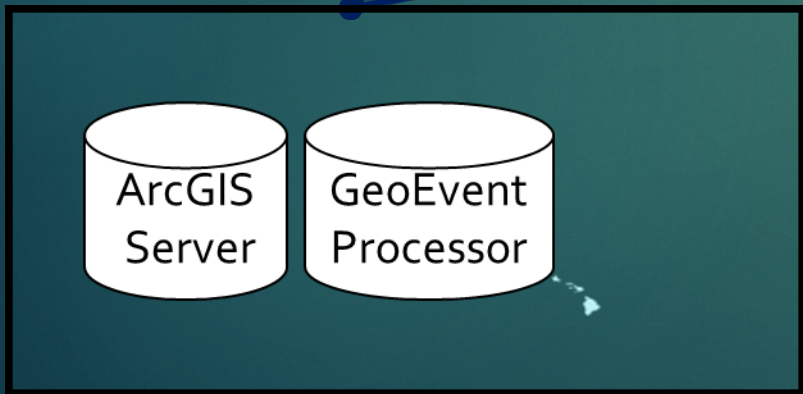
Dashboard





 **esri** - Centric

- ArgGIS On-Line
- ArcGIS
- ArcGIS Server
- Arc SDE
- GeoEvent Processor
- Operations Dashboard





# ArcGIS Server and GeoEvent What?

- ▶ ArcGIS Server (core)

Takes geographic content and makes it available over the web  
creates apps and views

- ▶ GeoEvent Processor (extension)

Has extra functionality to process real-time data streams (feeds from GPS devices)

Gives the server data to useable into useable form

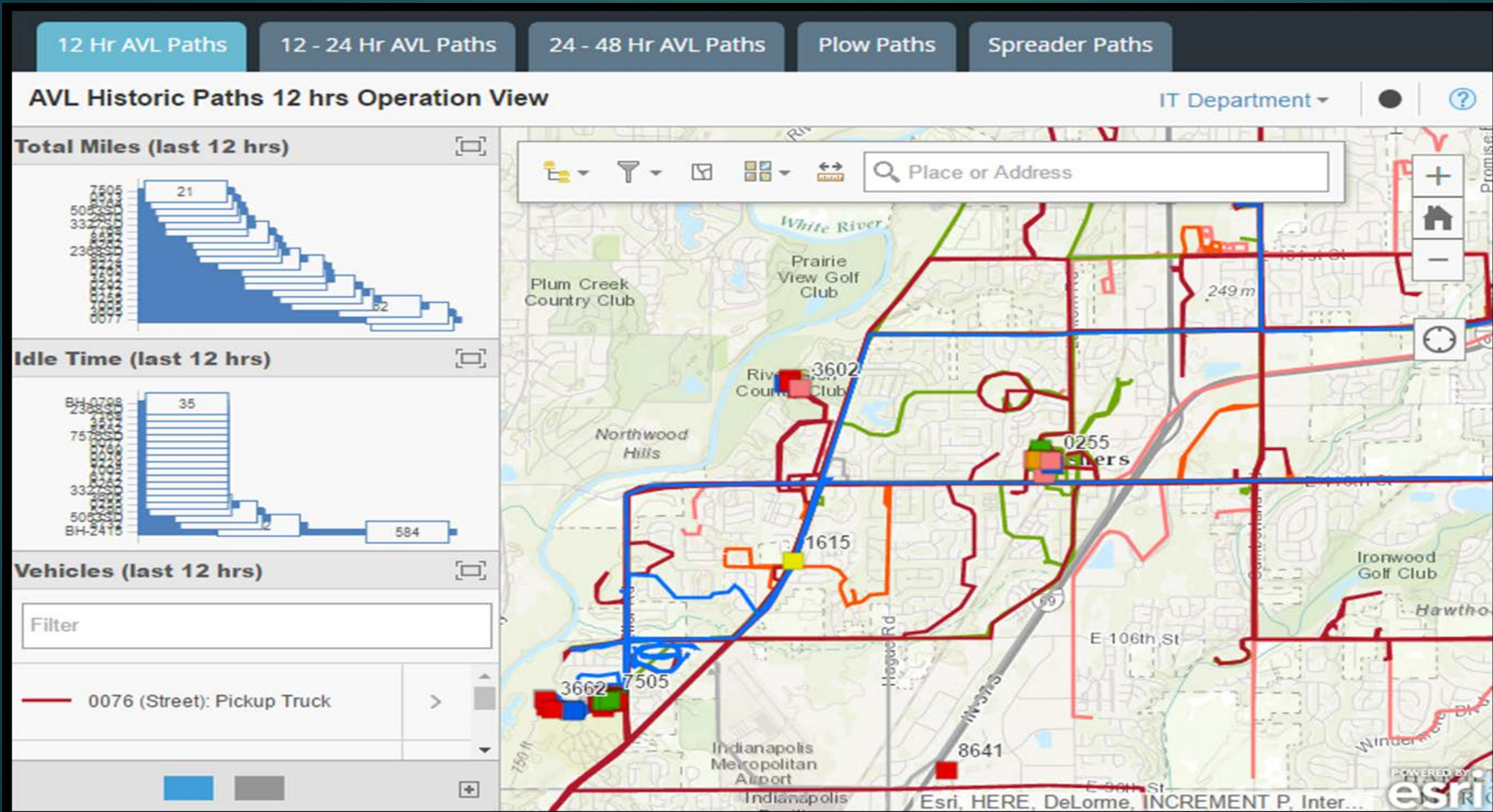




Device Type	OBD-II	Standard GPS	Advanced GPS
Vehicle Type	Passenger Vehicles/ Trucks	Any	Make/Model dependent
Speed	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Location	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Idle Time	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Engine Data	<input checked="" type="checkbox"/>	Vehicle Dependent	Vehicle Dependent
Behavior Data	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Additional Sensors		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Wi-fi			<input checked="" type="checkbox"/>



# Tabs Focused on Needs





# Interactive Graphs

## Fishers AVL Demo Viewer

0 - 12 hrs

12 - 24 hrs

Plow

Spreader

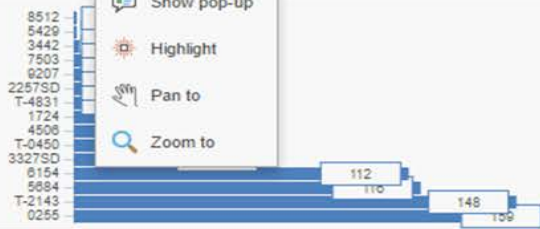
### Fishers AVL Demo 12 hrs Operation View

IT Department

#### Total Miles (last 12 hrs)

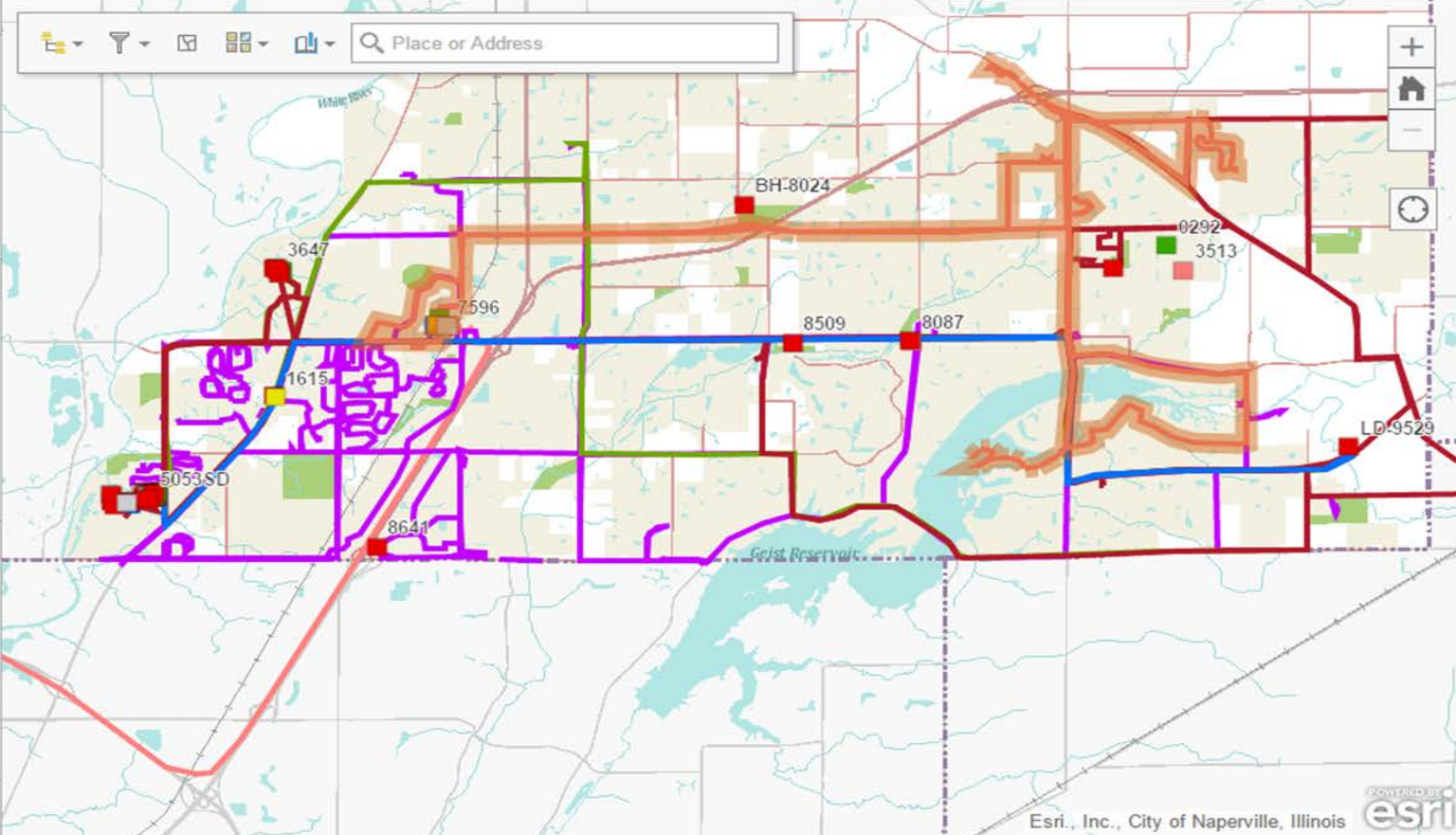


#### Total Idle Time (last 12 hrs)



#### Legend

- Community Development
- Engineering
- Facility Maintenance
- Fleet
- Parks
- Street
- Water Quality
- Other Vehicles



Esri, Inc., City of Naperville, Illinois



**FISHERS**

DEPARTMENT OF PUBLIC WORKS



# Ways to Filter

## Fishers AVL Demo Viewer

0 - 12 hrs 12 - 24 hrs Plow Spreader

### Fishers AVL Demo 12 hrs Operation View

IT Department

**Total Miles (last 12 hrs)**

7502	1
3327SD	2
T-4831	2
3442	3
7503	22
4508	27
T-0450	29
T-2143	42

**Total Idle Time (last 12 hrs)**

7502	0
3442	2
7503	6
T-4831	16
4508	44
T-0450	49
3327SD	64
T-2143	148

**Legend**

Last Known Location

- Community Development
- Engineering
- Facility Maintenance
- Fleet
- Parks
- Street
- Water Quality
- Other Vehicles

Place or Address

- Department: Engineering
- Department: Facility Maintenance
- Department: Parks
- Department: Street
- Department: Water Quality

**Paths (last 12 hrs)**

- All features
- Department: Community Development
- Department: Engineering
- Department: Facility Maintenance
- Department: Parks
- Department: Street
- Department: Water Quality

Esri, Inc., City of Naperville, Illinois

POWERED BY esri



# Last Known Location/Path

## Fishers AVL Demo Viewer

0 - 12 hrs 12 - 24 hrs Plow Spreader

### Fishers AVL Demo 12 hrs Operation View

IT Department

#### Last Known Location

8087

8087 (Street)

#### Paths (last 12 hrs)

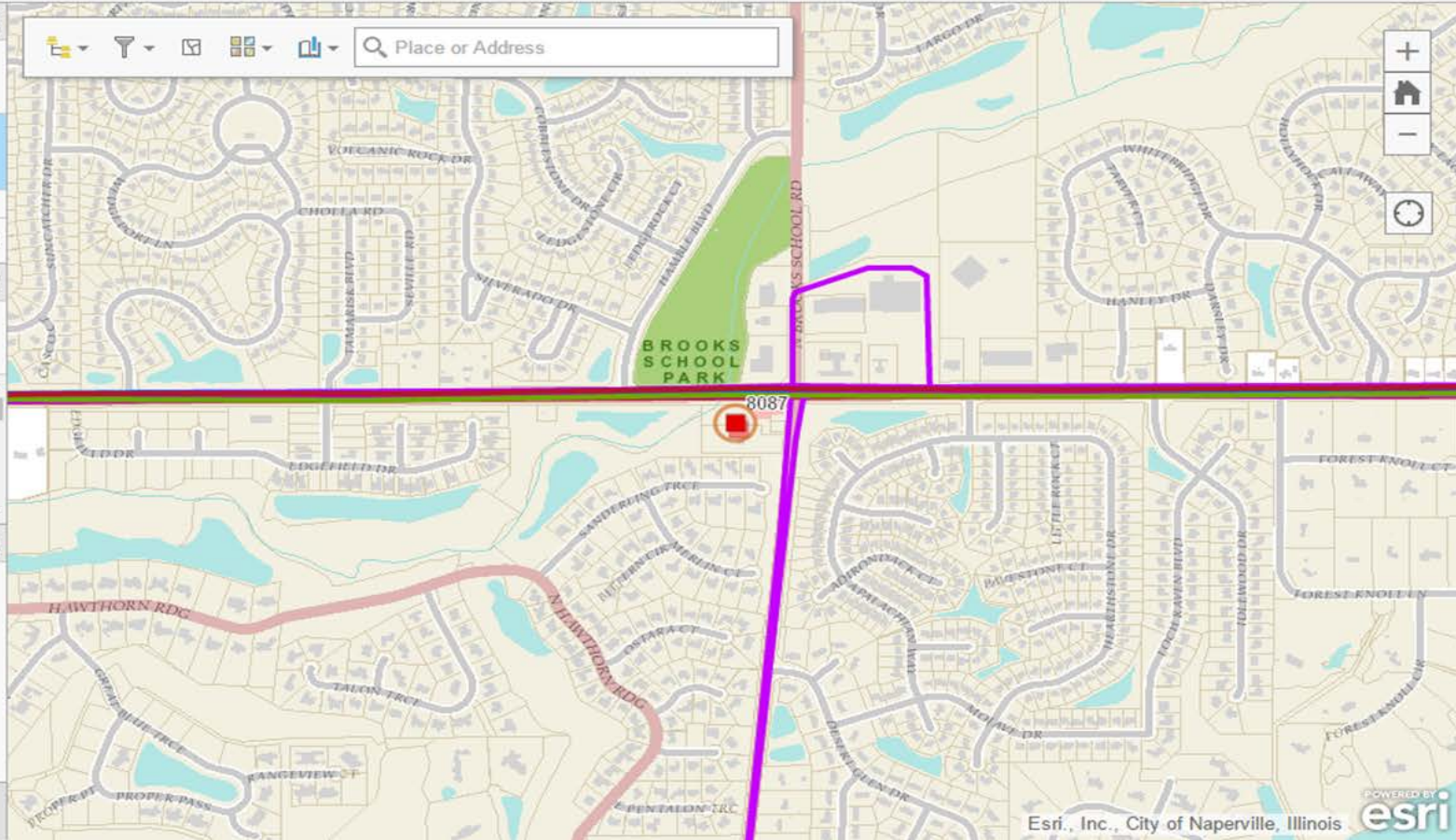
Filter

0255 (Community Development): 35 mi, 85 min running, 159 min idle

1724 (Community Development): 38 mi, 49 min running, 42 min idle

#### Path (last 12 hrs) Details

No Features



Esri, Inc., City of Naperville, Illinois



FISHERS

DEPARTMENT OF PUBLIC WORKS



# Zoom and Click

## Fishers AVL Demo Viewer

0 - 12 hrs 12 - 24 hrs Plow Spreader

Fishers AVL Demo 12 hrs Operation View IT Department

**Last Known Location**

Filter

0075 (Street)

**Paths (last 12 hrs)**

Filter

- 0255 (Community Development): 35 mi, 85 min running, 159 min idle
- 1724 (Community Development): 38 mi, 49 min running, 42 min idle

**Path (last 12 hrs) Details**

No Features

Map Search: Place or Address

Map Tools: Home, Zoom In, Zoom Out, Full Screen, Layers, Legend, Scale

Map Labels: 3647, 7596, 1615, 8641, 850, 8024, 0292, 2415, 351, Geist Reservoir

Context Menu: Paths (last 12 hrs): 0255

- Follow
- Show pop-up
- Highlight
- Pan to
- Zoom to

Powered by Esri, Inc., City of Naperville, Illinois



**FISHERS**

DEPARTMENT OF PUBLIC WORKS



# Highlight/Filter Paths

## Fishers AVL Demo Viewer

0 - 12 hrs 12 - 24 hrs Plow Spreader

### Fishers AVL Demo 12 hrs Operation View

IT Department

**Last Known Location**

Filter

0075 (Street)

**Paths (last 12 hrs)**

0255

0255 (Community Development): 35 mi, 85 min running, 159 min idle

**Path (last 12 hrs) Details**

Paths (last 12 hrs): 0255

Department: Community Development

Vehicle Number: 0255

Class: Passenger Vehicle

Maximum Vehicle Speed: 58



**FISHERS**

DEPARTMENT OF PUBLIC WORKS



# Vehicle Inquiry

## Fishers AVL Demo Viewer

0 - 12 hrs 12 - 24 hrs Plow Spreader

### Fishers AVL Demo 12 hrs Operation View

IT Department

#### Query GPS Points

Last executed: May 8, 2016, 7:50:22 PM

Number of results: 228

Limit the results to the current map extent

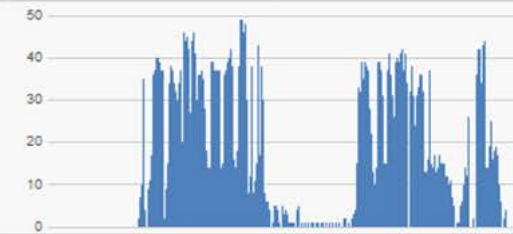
Hide

Zoom to

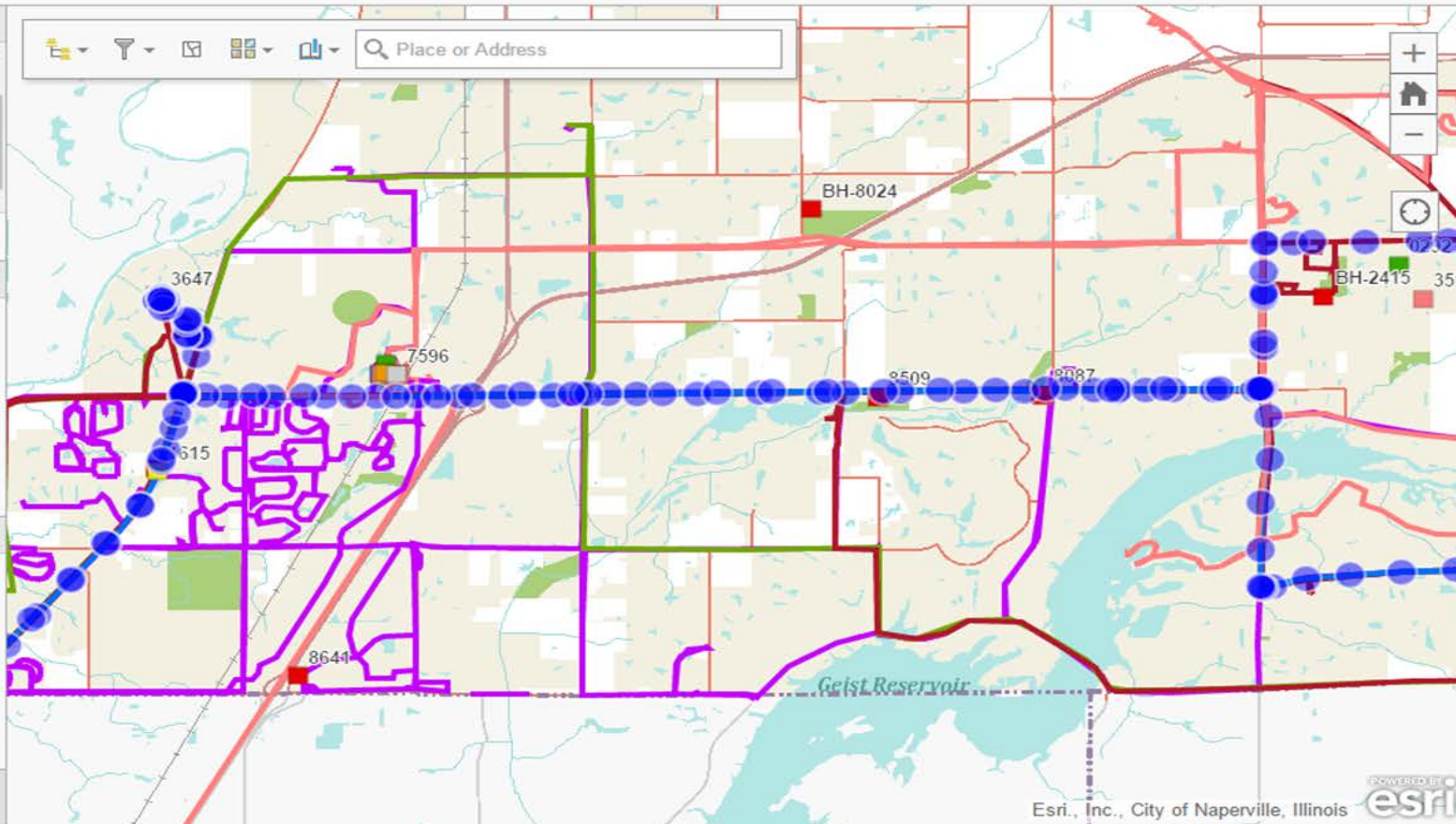
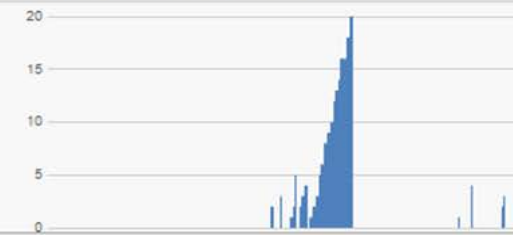
Done

Re-execute

#### Speed (selected vehicle)



#### Idle Time (selected vehicle)



Esri, Inc., City of Naperville, Illinois



**FISHERS**

DEPARTMENT OF PUBLIC WORKS



# Vehicle Detail Log

Last Known Location: 0075	
Timestamp	3/3/2017, 1:35 PM
Department	Street
Vehicle Number	0075
Year	2009
Make	Ford
Model	F350 4WD
Class	Pickup Truck
Heading	193
GPS Speed	0
Engine Ignition Sense	0
Plow UpDown	0
Spreader OnOff	0
Device Motion Sensor	0
Device Power State	0
Device Low Battery	0
Device High Temperature	0
Vehicle OBD JBUS Speed	0
RPMS	0
Throttle Position	14
OBD Odometer	104,724
Fuel Level Percentage	40
Engine Coolant	152
Fuel Rate	1
Battery Voltage	14
Turn Signal Status	0
Calculated Trip Odometer	14,301
Mileage From Install	9,114
Current Idle Time	0
Current Trip Mileage	0
Trip Stop Time Minutes	256
Trip Idle Time Minutes	0
Trip Run Time Minutes	0
Total Trip Time Minutes	0
DTC Count	0
DTCs	
Year	2017
Month	3
Week	9
Day	3
Day of Week	6
Current Engine State	3



# Historic Views

## Fishers AVL Demo Viewer

0 - 12 hrs

12 - 24 hrs

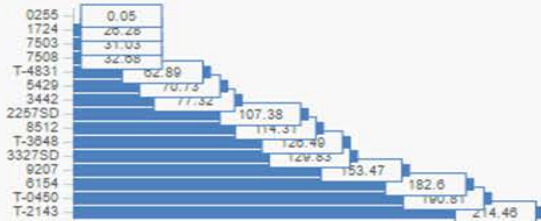
Plow

Spreader

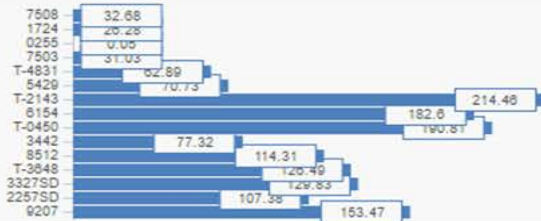
### Fishers AVL Demo 12-24 hrs Operation View

IT Department

#### Total Miles (12 - 24 hrs)

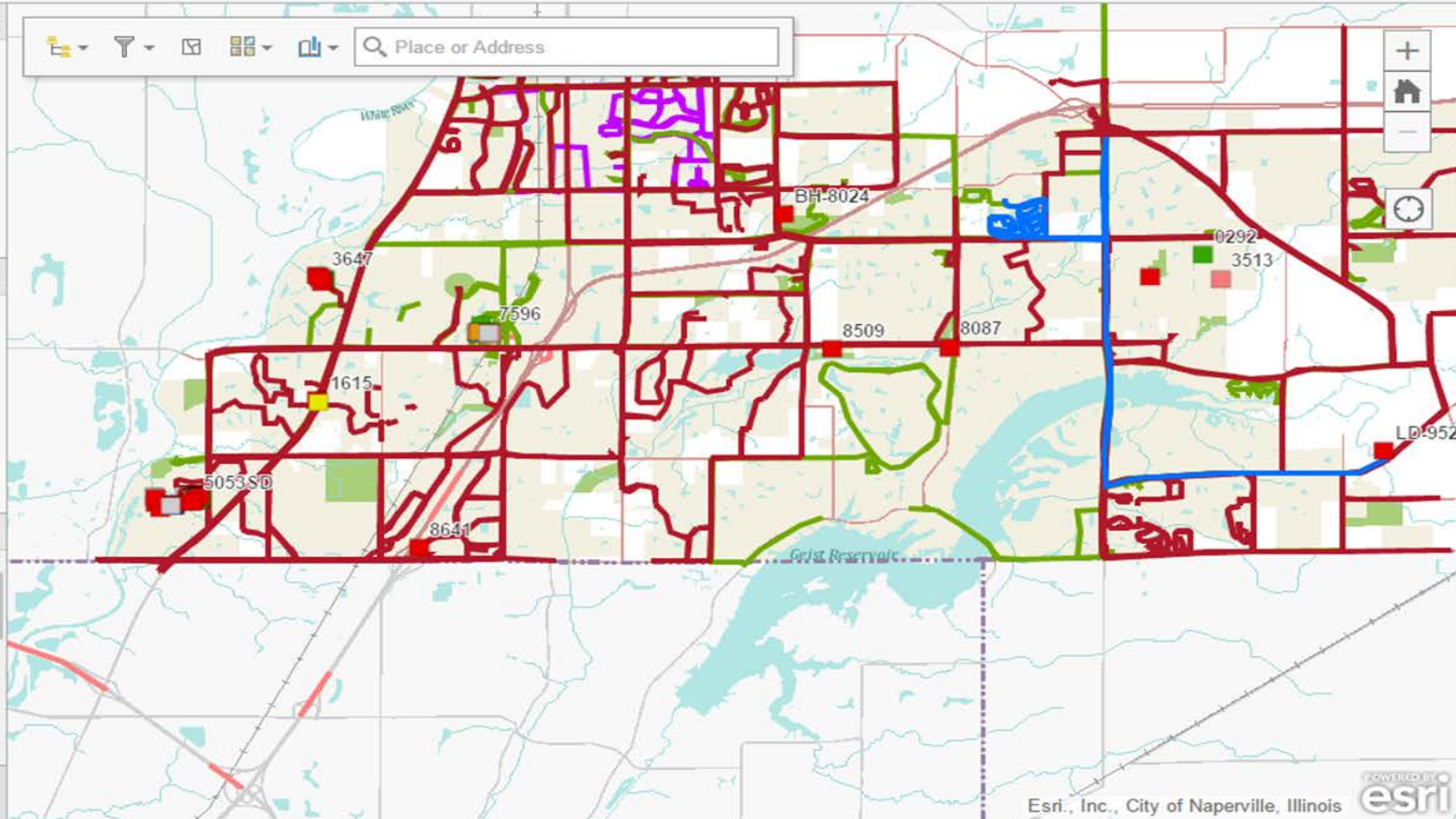


#### Idle Time (12 - 24 hrs)



#### Legend

- Last Known Location
- Community Development
  - Engineering
  - Facility Maintenance
  - Fleet
  - Parks
  - Street
  - Water Quality
  - Other Vehicles



FISHERS

DEPARTMENT OF PUBLIC WORKS



# Plow Status

## Fishers AVL Demo Viewer

0 - 12 hrs 12 - 24 hrs **Plow** Spreader

### Fishers AVL Demo Plow Operation View

IT Department

#### Plow Paths (last 8 hrs)

Filter

6154 (Facility Maintenance): 5 mi, 658 min running, 221 min idle

T-2143 (Street): 13 mi, 238 min running, 394 min idle

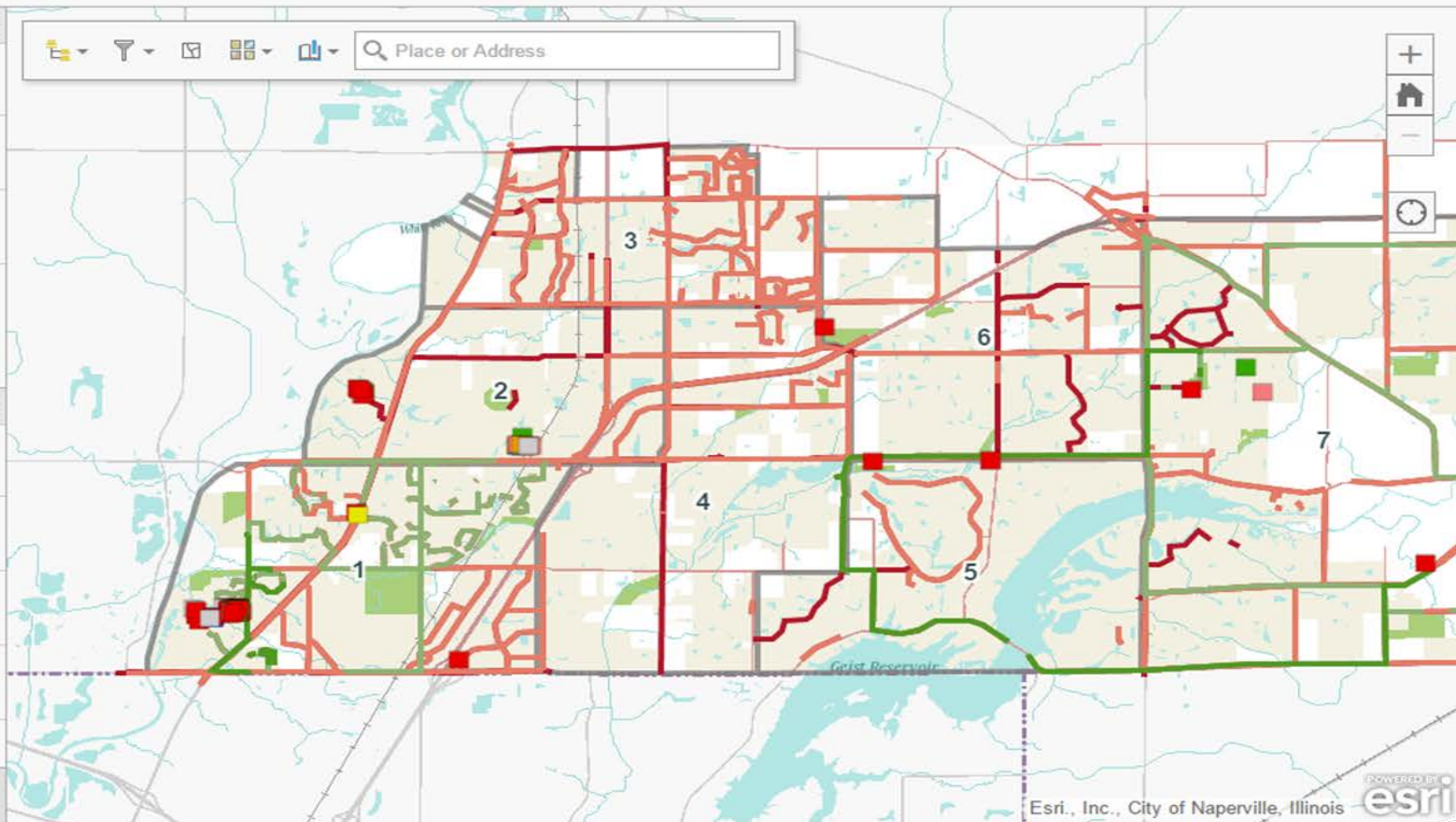
#### Plow Paths (last 12hrs)

Filter

6154 (Facility Maintenance): 25 mi, 5,763 min running, 906 min idle

T-2143 (Street): 38 mi, 781 min running, 1,301 min idle

T-4831 (Street): 2 mi, 6 min running, 7 min idle



Esri, Inc., City of Naperville, Illinois



**FISHERS**

DEPARTMENT OF PUBLIC WORKS



# Filter Plow Data

## Fishers AVL Demo Viewer

0 - 12 hrs 12 - 24 hrs **Plow** Spreader

### Fishers AVL Demo Plow Operation View

IT Department

#### Plow Paths (last 24hrs)

6154

6154 (Facility Maintenance): 128 mi, 42,089 min running, 10,416 min idle

#### Plow Paths (last 48hrs)

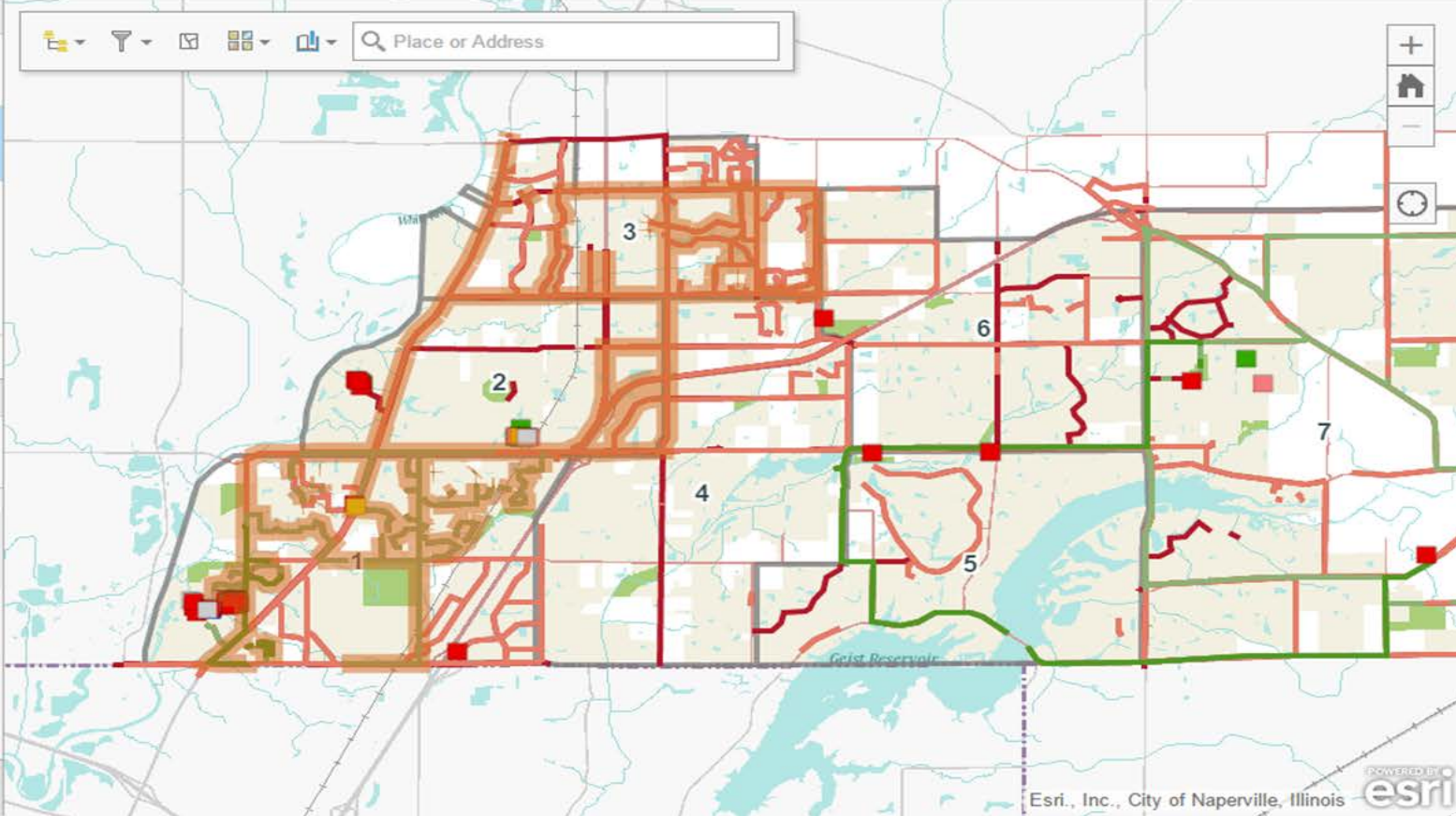
Filter

3327SD (Street): 82 mi, 14,256 min running, 5,790 min idle

5429 (Parks): 17 mi, 1,107 min running, 478 min idle

6154 (Facility Maintenance): 160 mi, 48,228 min running, 11,809 min idle

7508 (Parks): 25 mi, 789 min running, 42 min idle



Esri, Inc., City of Naperville, Illinois



**FISHERS**

DEPARTMENT OF PUBLIC WORKS



# Reporting

## Fishers AVL Demo Viewer

0 - 12 hrs

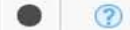
12 - 24 hrs

Plow

Spreader

### Fishers AVL Demo Plow Operation View

IT Department



#### Legend

##### Last Known Location

- Community Development
- Engineering
- Facility Maintenance
- Fleet
- Parks
- Street
- Water Quality
- Other Vehicles

##### Plow Paths (all times)

last 8 hrs

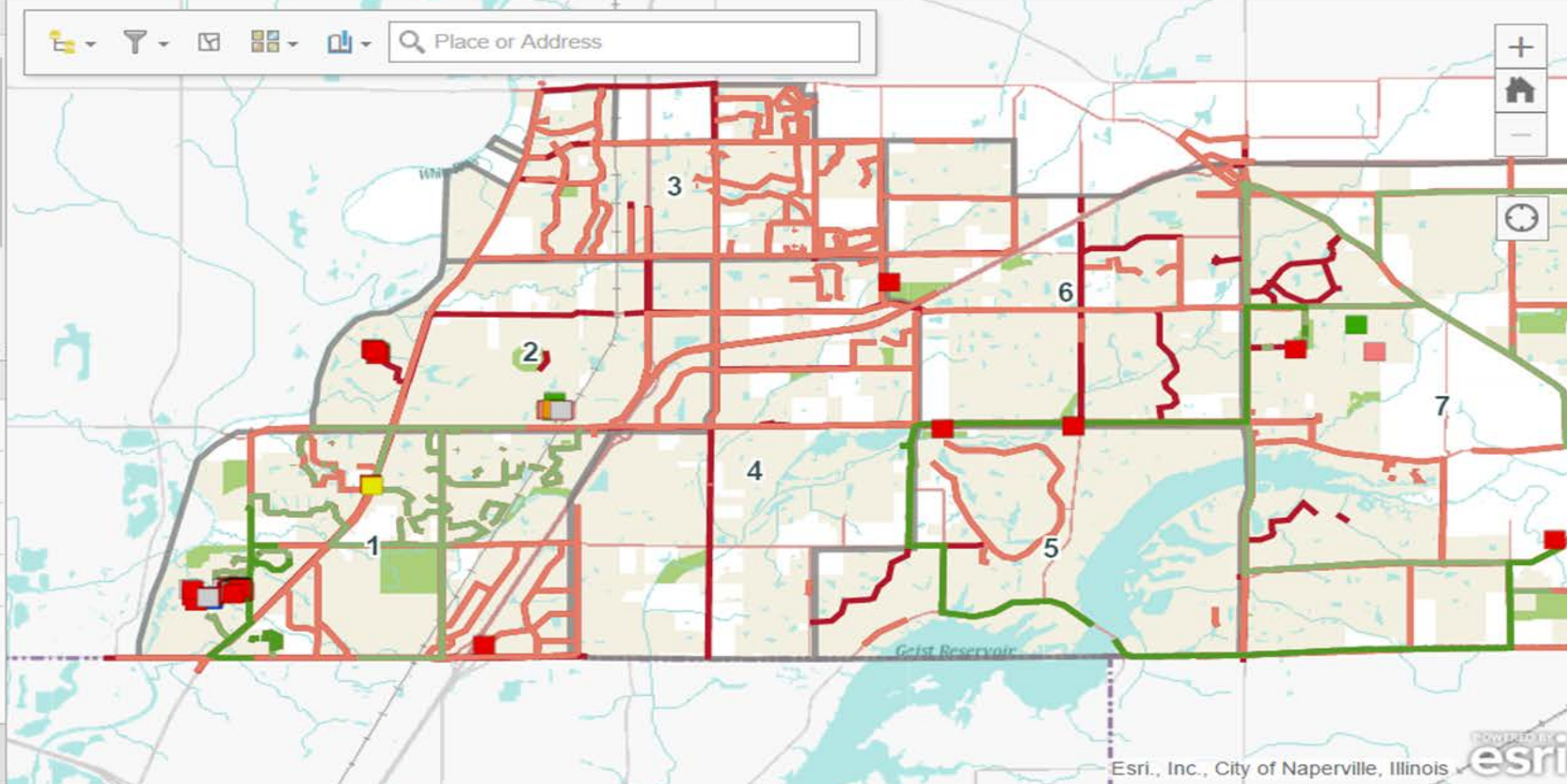
##### Total Miles Plowed

Last 8 Hrs Total Miles: 18.15

Last 12 Hrs Total Miles: 64.9

Last 24 Hrs Total Miles: 584.7

Last 48 Hrs Total Miles: 998.65



Esri, Inc., City of Naperville, Illinois



**FISHERS**

DEPARTMENT OF PUBLIC WORKS



# Pitfalls

- ❖ Multiple Stakeholders – to be successful, communications between departments and contractors outlining responsibilities is essential.
- ❖ Know your equipment and try to standardize vehicles and controls
- ❖ Not having an end goal
- ❖ Not giving your contractor remote access to the server that houses all the AVL data or vice versa
- ❖ Not being a mobile friendly work place
- ❖ Not getting staff buy-in



# Future Goals

- ❖ Geofence areas ( School property) to improve accuracy of invoicing
- ❖ Create plow/deicing routes – turn by turn directions
- ❖ Integrate sensor conditions and warnings into list of alerts
- ❖ Reporting - day-to-day, month-to-month, year-to-year
- ❖ Live mapping to share with public
- ❖ We don't know what we don't know.....



Questions?



# Contact Info -

Sean O'Grady

City of Fishers Assistant Director of Public Works

[ogradys@fishers.in.us](mailto:ogradys@fishers.in.us)

317-709-4980

@fishersDPW

@DriveFishers