

Public Safety Routing Using ArcGIS Online and HERE Data

Knowledge, Skills, and Abilities (KSAs) Supported

This training module develops several KSAs that are fundamental to using GIS to support public safety planning and operations. The ability to conduct routing using ArcGIS Online and HERE data is a foundation-level skill that is relevant to a multitude of GIS applications. This training tutorial builds on the KSAs developed through the previous tutorial titled “Public Safety Geocoding using ArcGIS Online and HERE Data.”

Knowledge Gained:

- ✓ Routing process – Routing is a type of network analysis that determines the best route from one network location to one or more other locations. It can also calculate the quickest or shortest route depending on the impediment chosen. The order of the stops may be determined by the user. For example, if the impediment is time, then the best route is the quickest route.
Source: <http://support.esri.com/en/knowledgebase/Gisdictionary/browse>
- ✓ How routing features can be applied to achieve more efficient public safety operations and planning.
- ✓ Esri has selected HERE Map Content as the foundation street data for its cloud-based mapping platform as well as for StreetMap Premium and numerous other Esri products.
- ✓ Esri uses HERE map content and HERE point addressing to build the geocoding locators used in both ArcGIS Online (AGOL) and StreetMap Premium (SMP).

Skills and Abilities Developed:

- ✓ Ability to apply routing features to determine time efficiency in an operational law enforcement scenario.
- ✓ How to overlay imagery with HERE map content while maintaining visibility of both.
- ✓ How to use real-time HERE traffic data to determine time efficiency in routing options.
- ✓ How to complete a one-to-many route operation using AGOL and HERE map content.
- ✓ How to run a routing analysis and set up optimized assigned stops.

This training tutorial is intended for training, exercise, and preparedness efforts only. It is not intended to support emergency response operations.

Public Safety Geocoding Scenario in ArcGIS Online

This tutorial uses two real-life law enforcement scenarios:

- Scenario 1: There is a disturbance at The Village at Gulfstream Park, which is within the jurisdiction of the BSO Pembroke Park West Park District Office, and a police vehicle needs to be dispatched and routed to that location as quickly as possible.
- Scenario 2: Sheriff Scott, (http://sheriff.org/about_bso/admin/sheriff/) would like to visit all of the Broward Sheriff's Office District Offices to see the district officers' work first-hand and understand their equipment needs and requirements.

Step 1: Sign In to AGOL

Go to <http://napsg.maps.arcgis.com/home/> and take a moment to familiarize yourself with the mission and resources provided by NAPSG.



If NAPSG provided you with credentials, click **Sign In** and enter them. **If you do not have NAPSG credentials**, navigate to your own organization's ArcGIS Online page, and sign in there with your credentials. Depending on which organization's ArcGIS page your using, the sign in window will look different.

Username: XXXXXX

Password: XXXXXX

Sign in to NAPSG Foundation esri

Username

Password

Keep me signed in

SIGN IN

[Forgot password?](#) [Forgot username?](#)

Once you have entered your credentials, click [Sign In](#).

If you signed into NAPSG's ArcGIS page, then your screen should look like below. If you signed into your own organization's page, the home screen will be different.



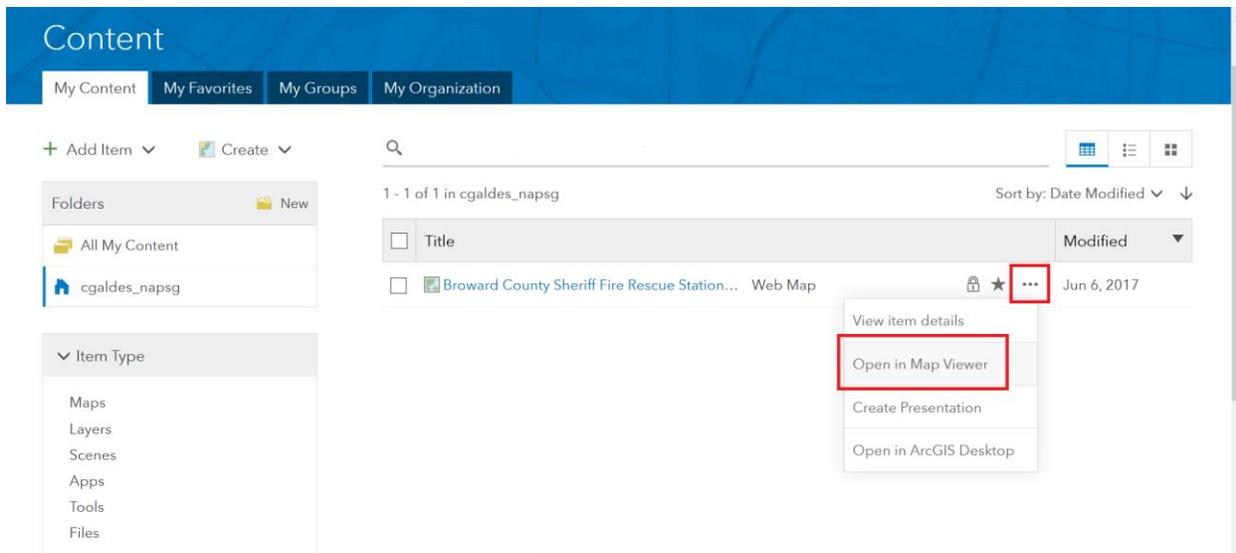
Step 2: Identify Available Content

Click on the [Content](#) tab to see what content you have available and to open the map you worked on in the Geocoding Exercise.

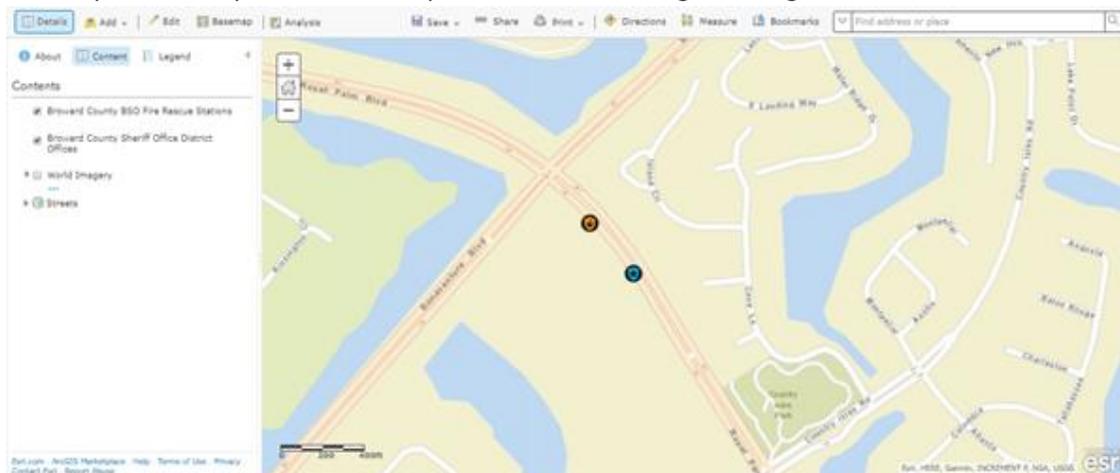


Step 3: Open the Broward County Sheriff Fire Rescue Station and District Offices Map

Click on the ellipsis to access a drop-down menu; select [Open in Map Viewer](#).

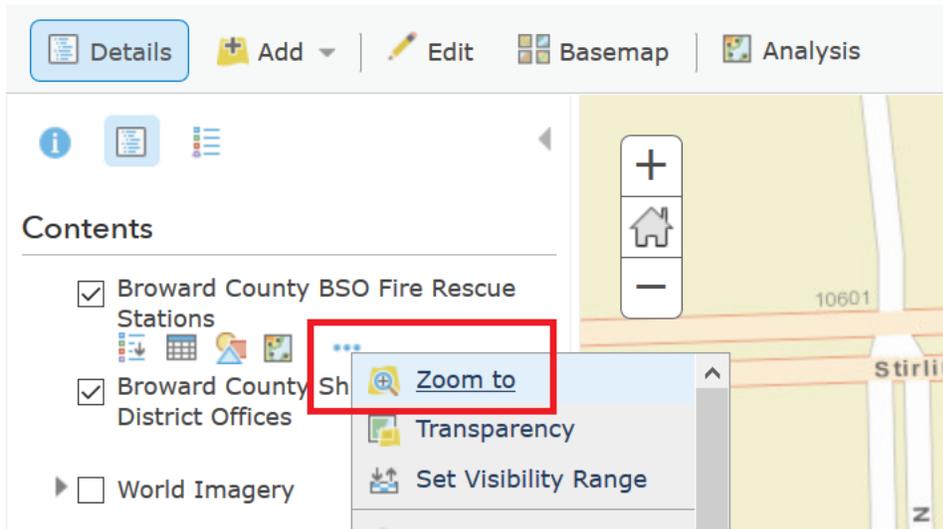


The map looks like you left it in the previous exercise on geocoding:

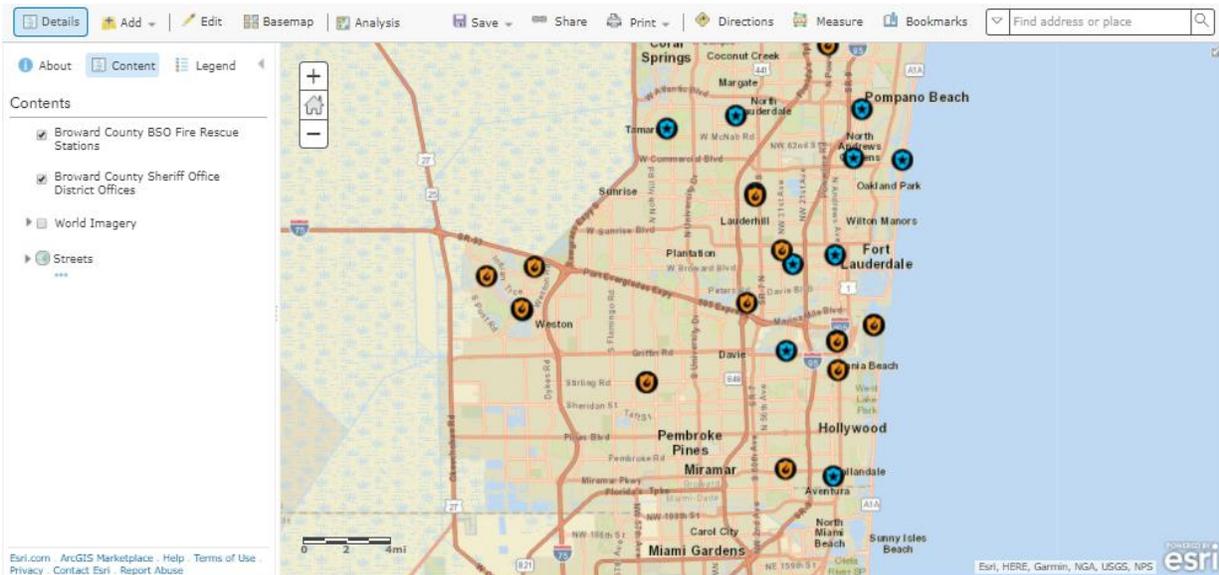


Next, let's zoom to the full extent of the police and fire rescue stations. Click on the ellipses next to the icons in the Broward County BSO Fire Rescue Stations layer and a drop-down menu will appear. Select **Zoom to**.

Home ▾ Broward County Sheriff Fire Rescue Station



The map canvas will look like this:



Now let's play out the scenarios.

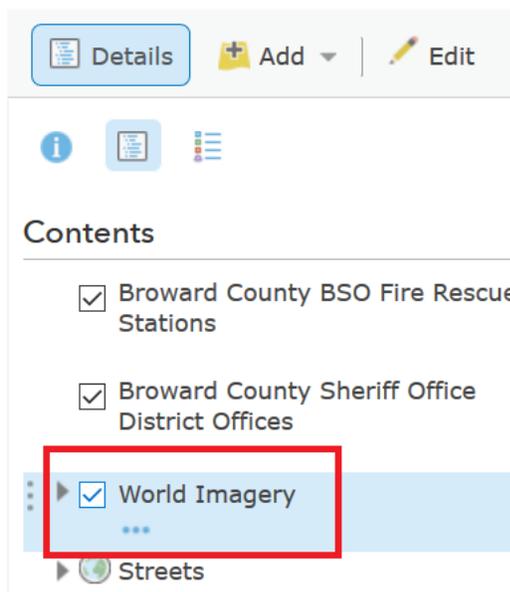
Step 4: Scenario 1

There is a disturbance at The Village at Gulfstream Park, which is within the jurisdiction of the BSO Pembroke Park West Park District Office, and a police vehicle needs to be dispatched and routed to that location.

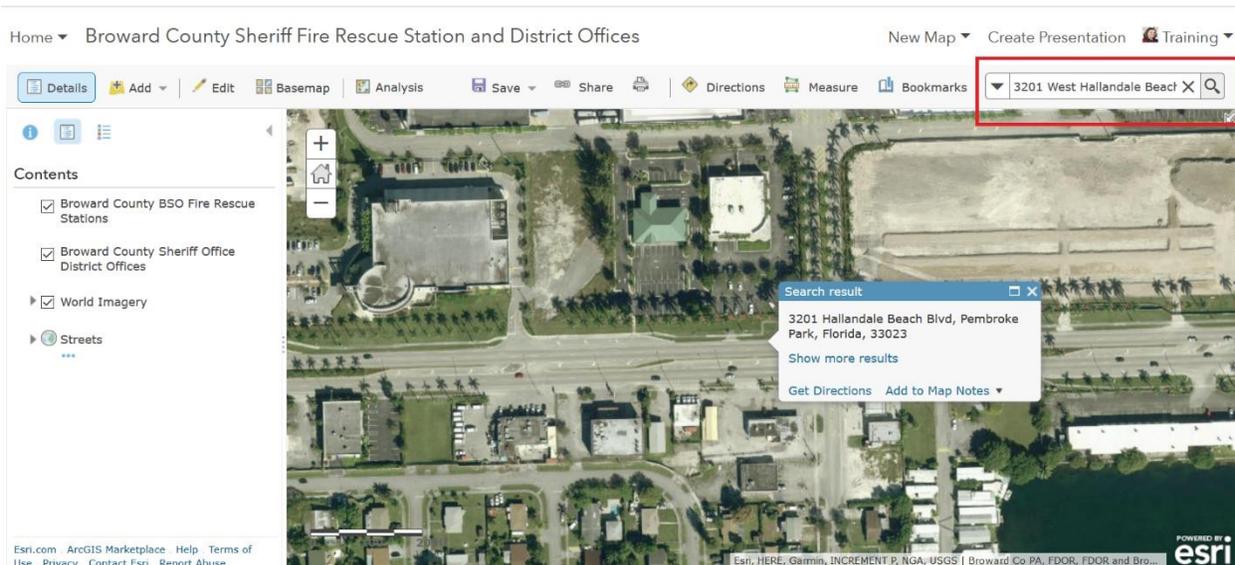
From a situational awareness perspective, you always want to get the essential information about an incident location to ensure you make the best decisions when responding. To start, we will ensure we can see what buildings and landmarks are in this area, so we will turn on the World Imagery layer.

Add a check box to the **World Imagery layer** in the table of contents.

Home ▾ Broward County Sh



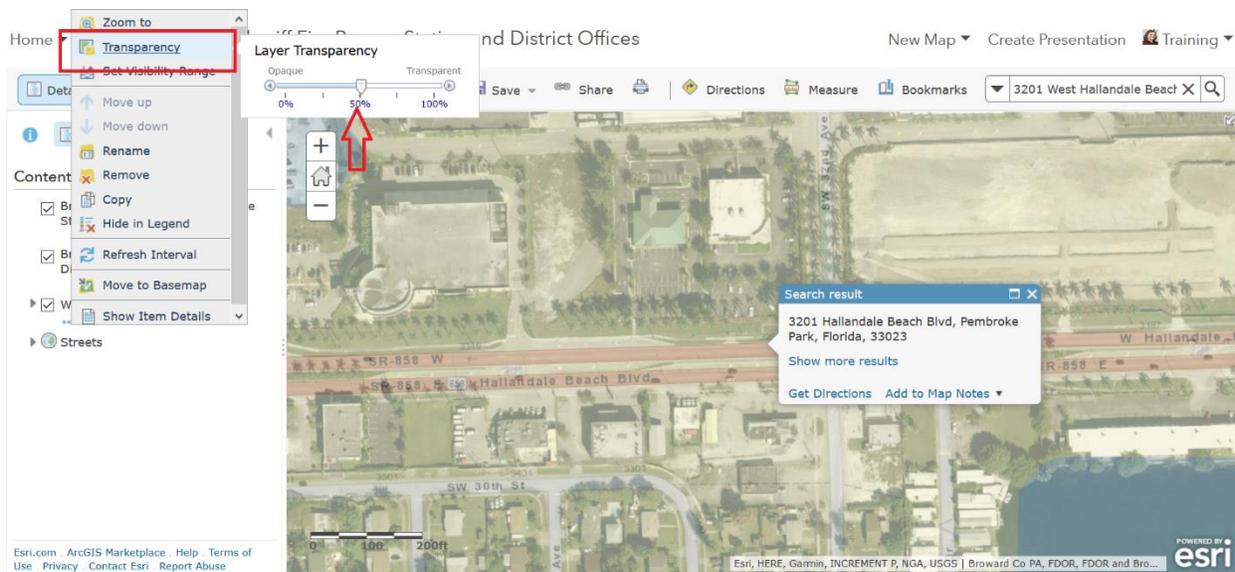
In the upper right corner, find the address search bar. **Type in** the address for the West Park District Office (3201 West Hallandale Beach Blvd, Pembroke Park, FL 33023) and **hit enter**.



What happened to the Streets layer?

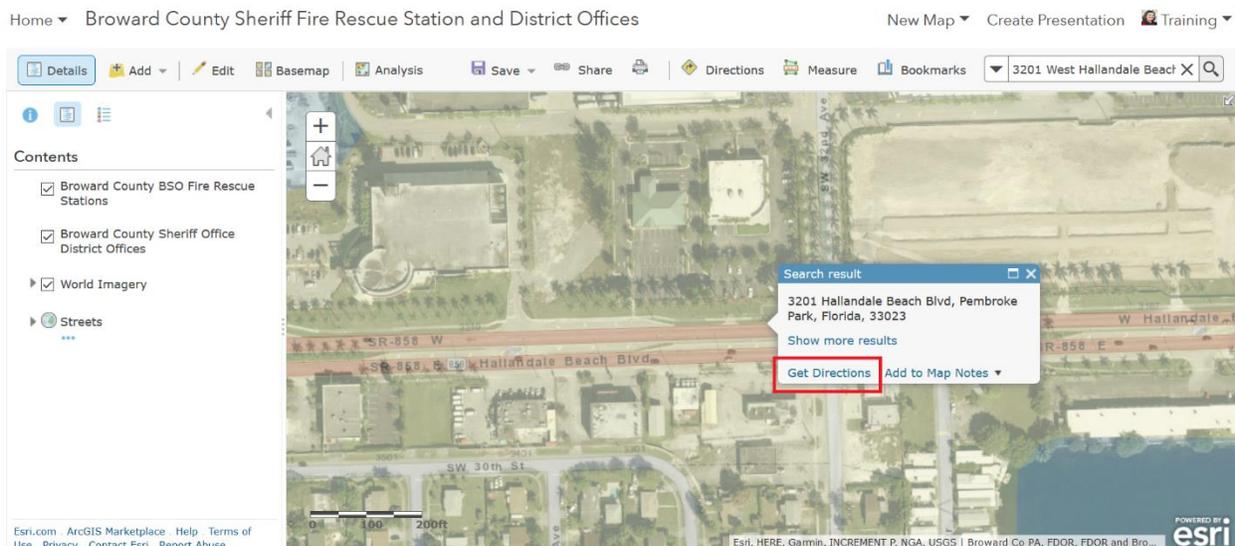
The imagery totally covers the Street layer. Let's modify the transparency of the World Imagery layer.

Click the **ellipses** after the **World Imagery layer** to access a drop-down menu. From the menu, select **Transparency** and **set it at 50% transparency** as shown below:



Now you can see the street and the imagery.

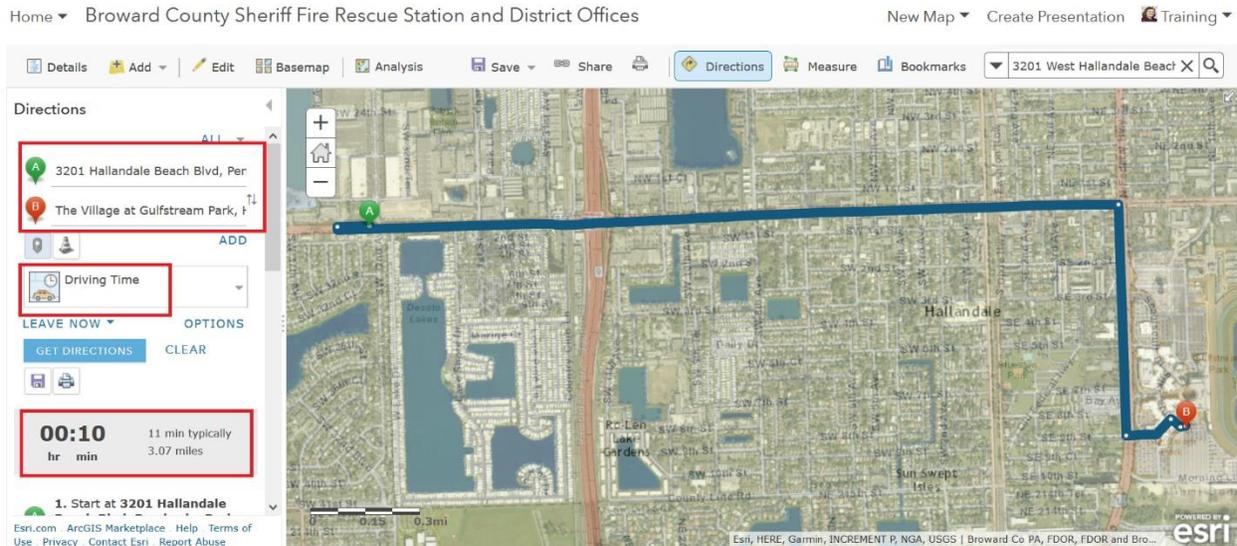
Click on the search box, and **click enter** again to get the Location pop-up window:



Click on **Get Directions** as shown above.

A couple of things happen very fast:

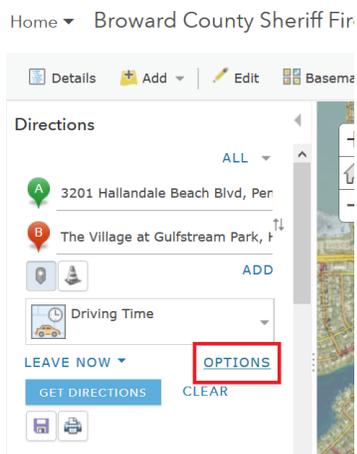
- ArcGIS Online finds “3201 West Hallandale Beach Blvd, Pembroke Park, FL 33023” and places this location in the “A” (“origin” or “from”) box
- In the “B” box (destination from point “A”) **type The Village at Gulfstream Park** – this is where the disturbance is happening. **Hit enter** to have ArcGIS Online geocode both locations and create a driving route.



In this case, it will take 10 minutes to drive 3.07 miles from the BSO Pembroke Park, West Park District Office to The Village at Gulfstream Park.

What if we take real-time traffic into account?

To use the HERE Traffic available in ArcGIS Online to calculate how long it will take, **click on OPTIONS** and then **check SHOW TRAFFIC**.



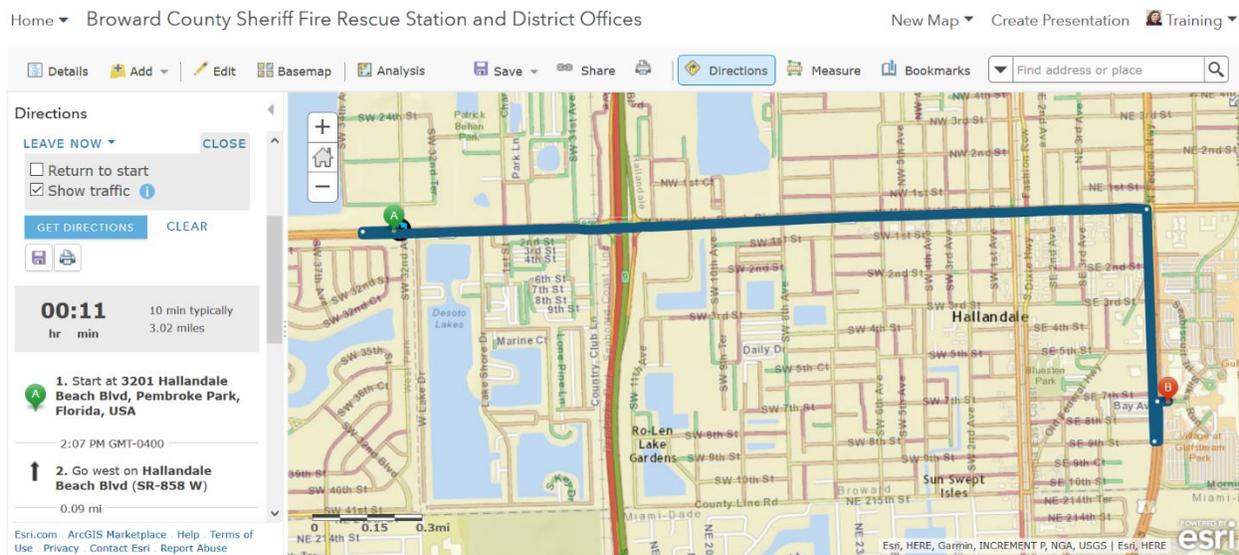
Now add a check mark to **Show traffic** and click on **GET DIRECTIONS**.

The distance remains the same, and given current traffic conditions the travel time will now be 11 minutes to get to The Village at Gulfstream Park.

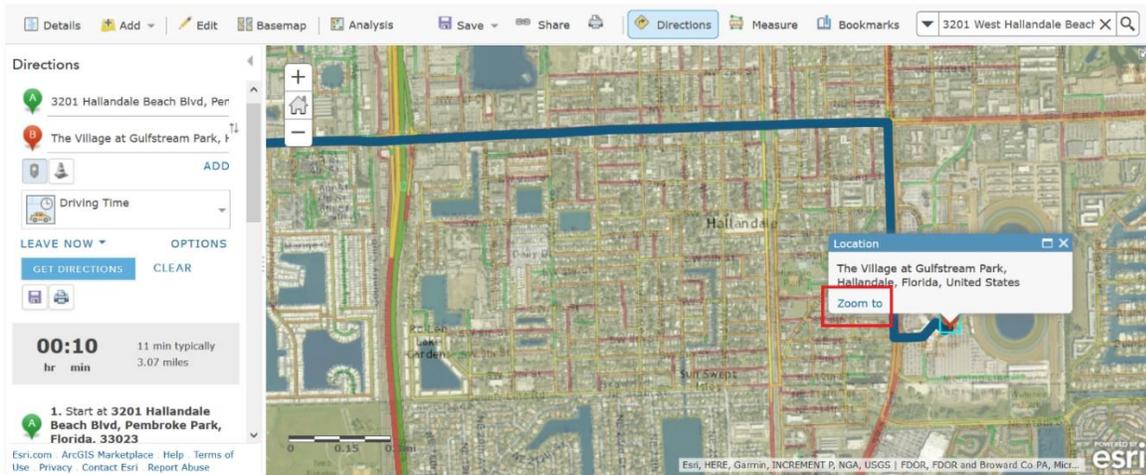
Notice in the map below how the HERE Traffic uses different colors to indicate level of traffic:

- Green: free-flow traffic
- Yellow: slow-flow traffic
- Red: heavy traffic

Your resulting driving time and how the map looks will be different depending what time of day or night you perform this step.



Let's see if we can get more details about The Village at Gulfstream Park. **Click** on the "B" location and then click on **Zoom to** as shown in the graphic below. The map canvas looks like this with more details about access to the "incident" location in question, including parking lots and building structures. Zoom out as needed to get a better view.



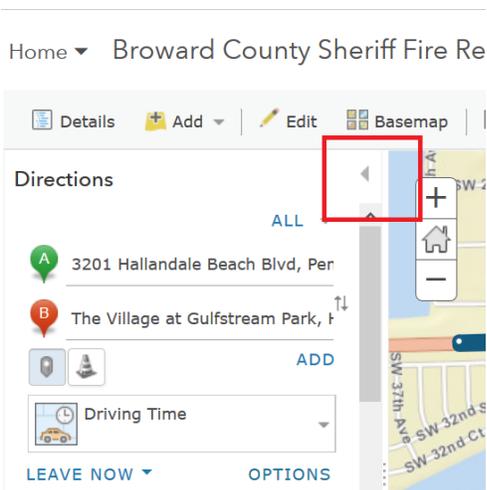
In Steps 1-4 You Learned:

- ✓ How the routing process works in a public safety scenario.
- ✓ How to overlay imagery while maintaining the view of streets from the HERE map content.
- ✓ How to turn on and use the HERE real-time traffic feed.

Step 5: Scenario 2

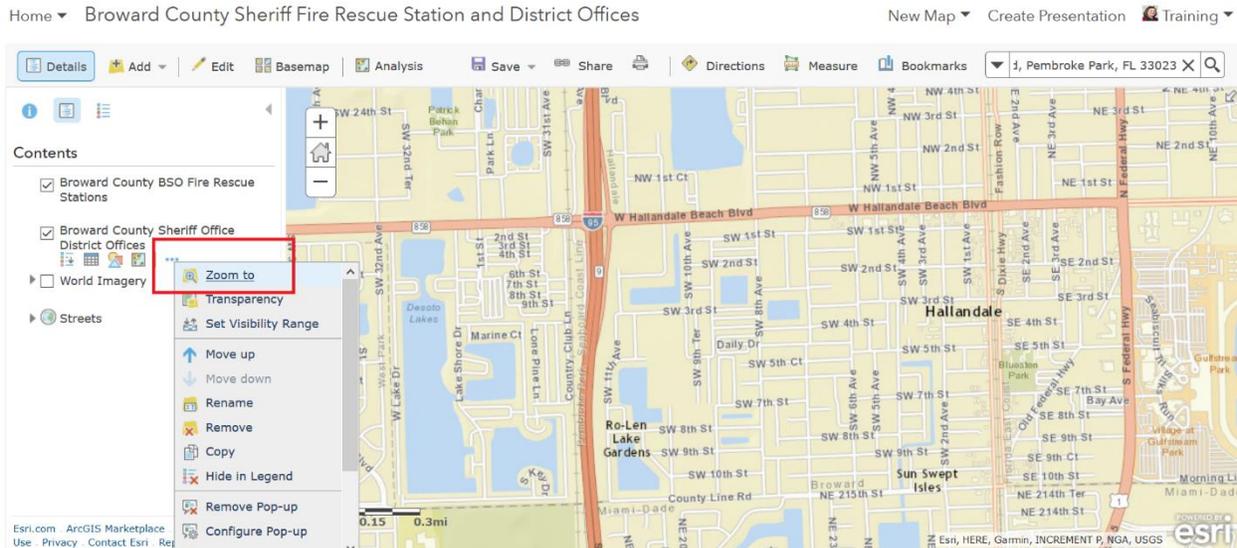
Now Sheriff Scott would like to visit all of the Broward Sheriff's Office District Offices to see the work of his team first-hand and learn what their equipment needs and requirements are. In order to do this, he needs to determine how he will get to all of the Sherriff Offices across the county in the most efficient way possible. You are going to help him route his visits using GIS.

Click on the [back arrow](#) on the table of contents:

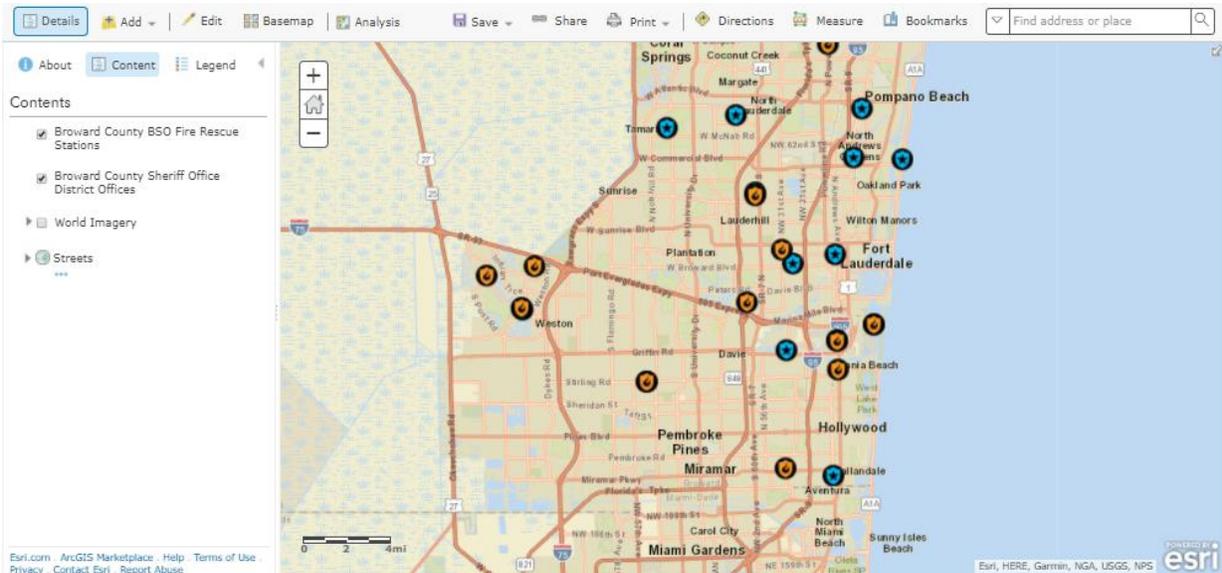


Then **remove the check mark** on the World Imagery layer to turn it off.

Click on the drop down menu for the Broward County BSO Fire Rescue Station and select **Zoom to** in order to zoom to the map extent of this layer.



The map canvas should look like this:

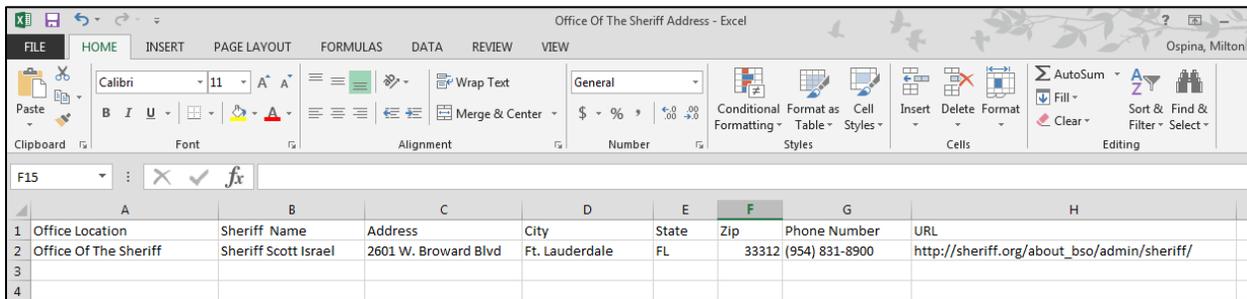


We already know the locations of all the Broward County Sheriff Office District Offices that Sheriff Scott will visit. We also know from looking at his website (under “Contact Us”) that he’s based at 2601 W. Broward Blvd., Ft. Lauderdale, FL 33312.

One-to-Many Route Operation:

In order to route from a single location—in this case, Sheriff Scott’s office location—to all of the Broward County Sheriff Office District Offices, we need to add the location of Sheriff Scott’s address into ArcGIS Online as a point feature we can route from.

In your routing exercise folder, there is a .csv file called *Office of The Sheriff Address.csv*. If you open this file, it will look like the below. *Note: you may have to resize the columns.*



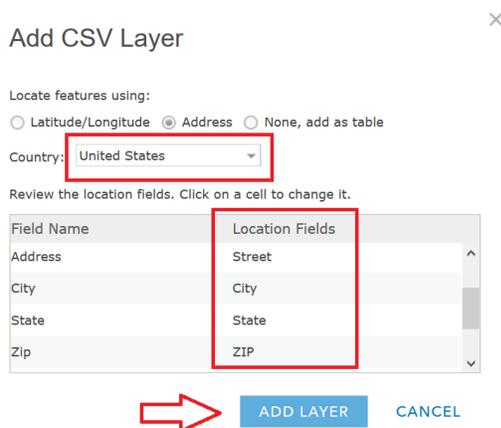
Office Location	Sheriff Name	Address	City	State	Zip	Phone Number	URL
Office Of The Sheriff	Sheriff Scott Israel	2601 W. Broward Blvd	Ft. Lauderdale	FL	33312	(954) 831-8900	http://sheriff.org/about_bso/admin/sheriff/

The file above is formatted so that ArcGIS Online knows how to address-match and geocode it so that a point feature is created at this geographic location.

Close the *Office of The Sheriff Address.csv* file (*note: do not save changes if prompted by Excel*) and **drag-and-drop it** onto the map canvas.

In the “Add CSV Layer” dialog box, ArcGIS Online already made some choices based on the format of the .csv file. It knows this is for a United States address and it matches the field names it needs to geocode this address.

Click on **ADD LAYER**.



Add CSV Layer

Locate features using:

Latitude/Longitude Address None, add as table

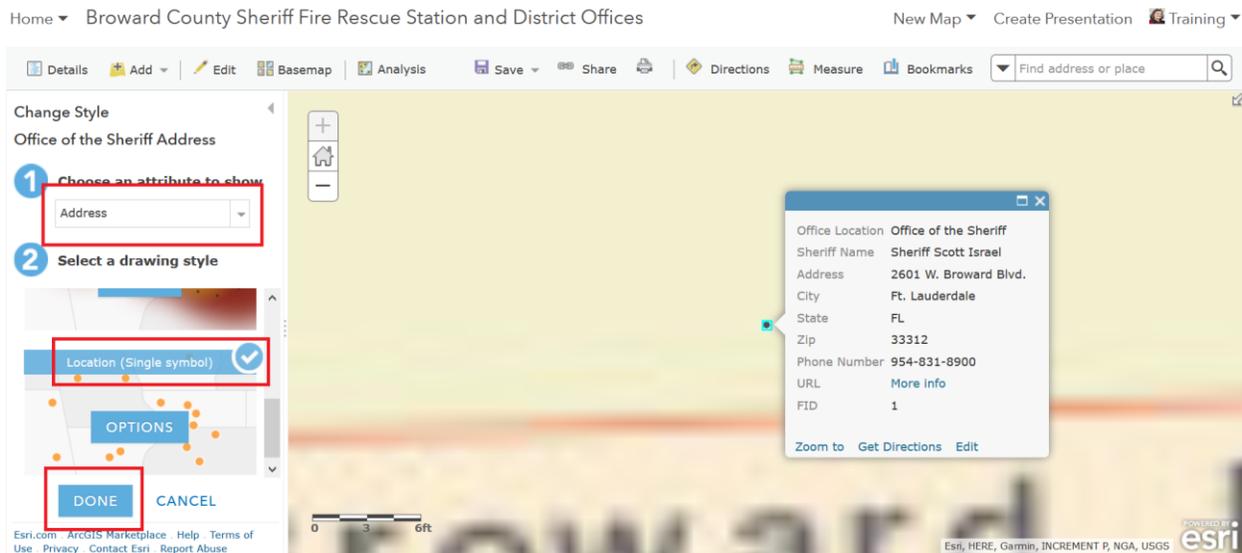
Country: United States

Review the location fields. Click on a cell to change it.

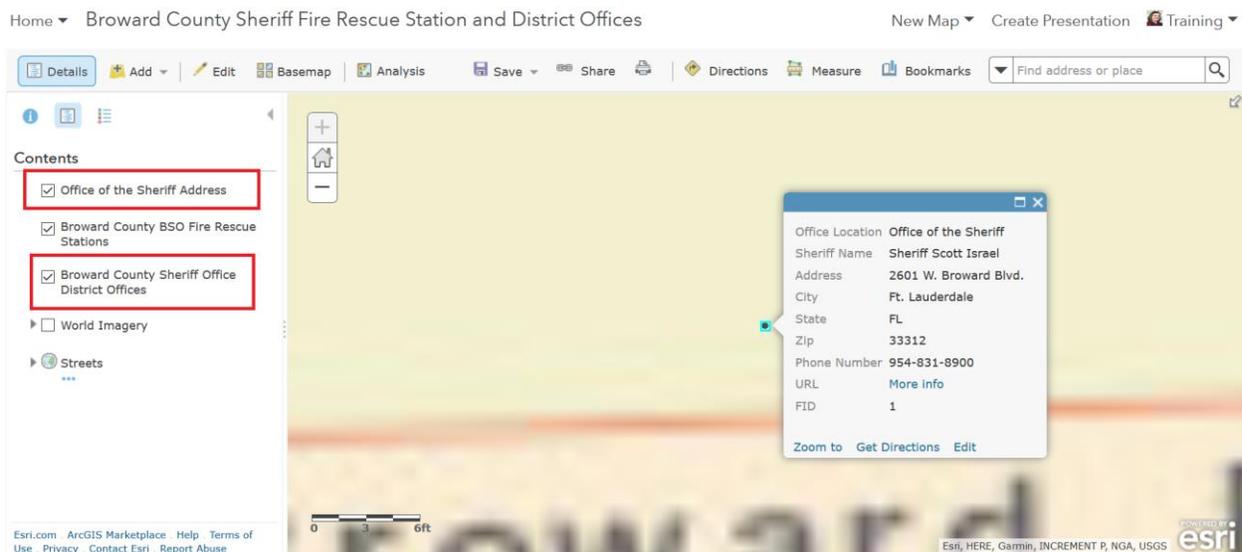
Field Name	Location Fields
Address	Street
City	City
State	State
Zip	ZIP

ADD LAYER CANCEL

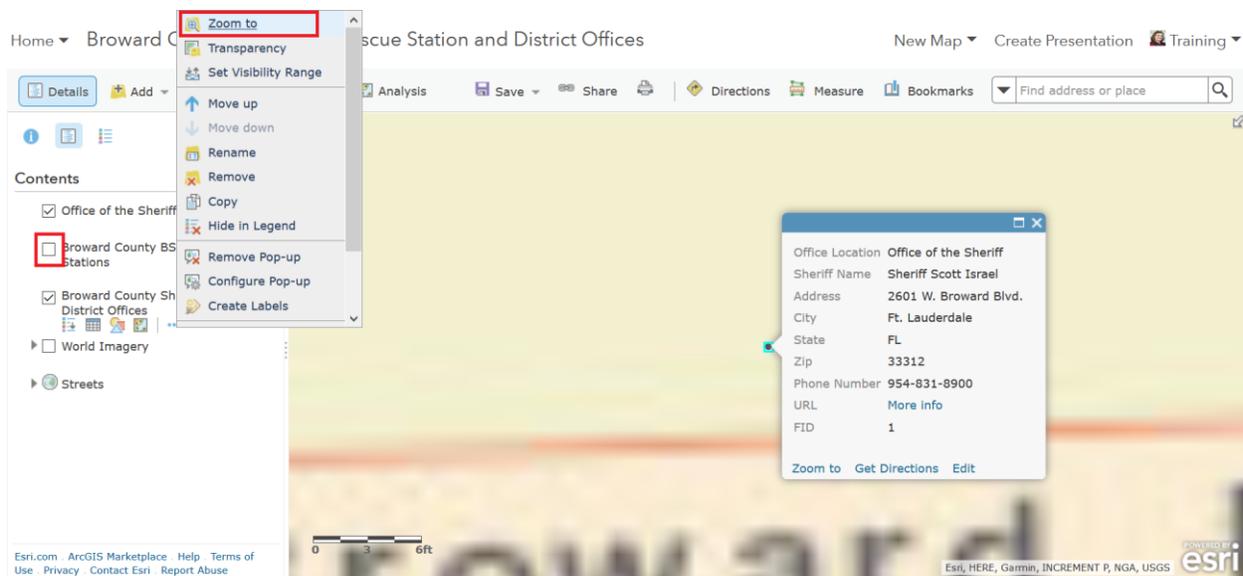
After it geocodes the address, **click on the orange dot**. Now look at the **Choose an Attribute to Show** dropdown menu, and choose **Address**. You will be prompted to “select a drawing style” for displaying this attribute. Since we want to show one location, not multiple locations with different symbols, select **Location (single symbol)** and press **Done**.



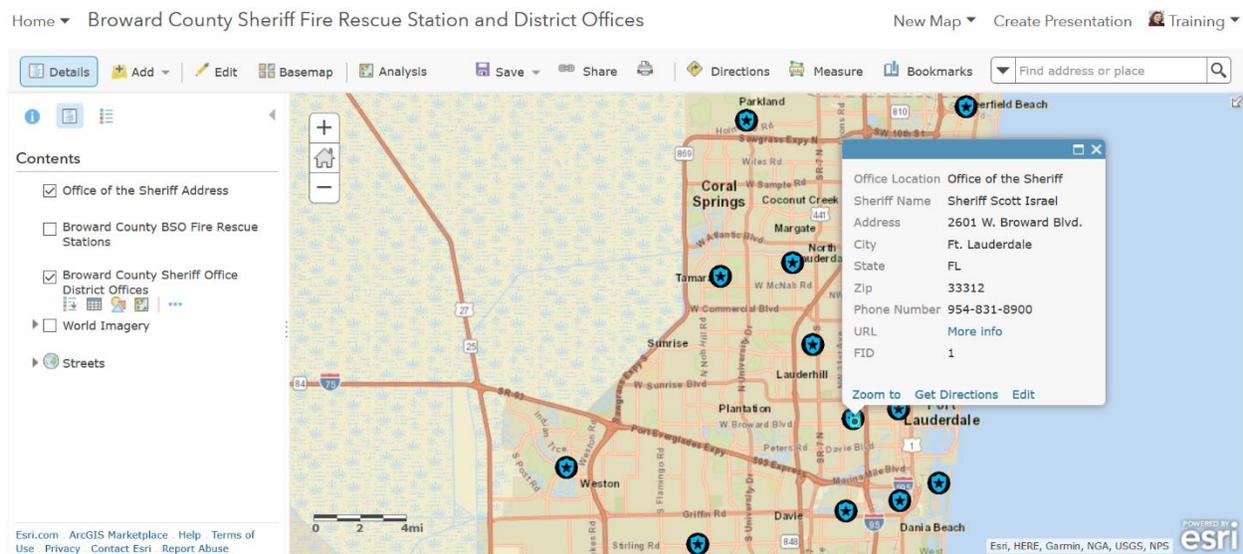
Now in our menu we have our “from” location, as well as our “to” locations, which are all the Broward County Sheriff Office District Offices. While there is only one “from” location, there are a total of 16 “to” locations!



Turn off the Broward County BSO Fire Rescue Stations and **Zoom to** the extent of the Broward County Sheriff Office District Offices layer, as depicted below.



Your map should now look like this:

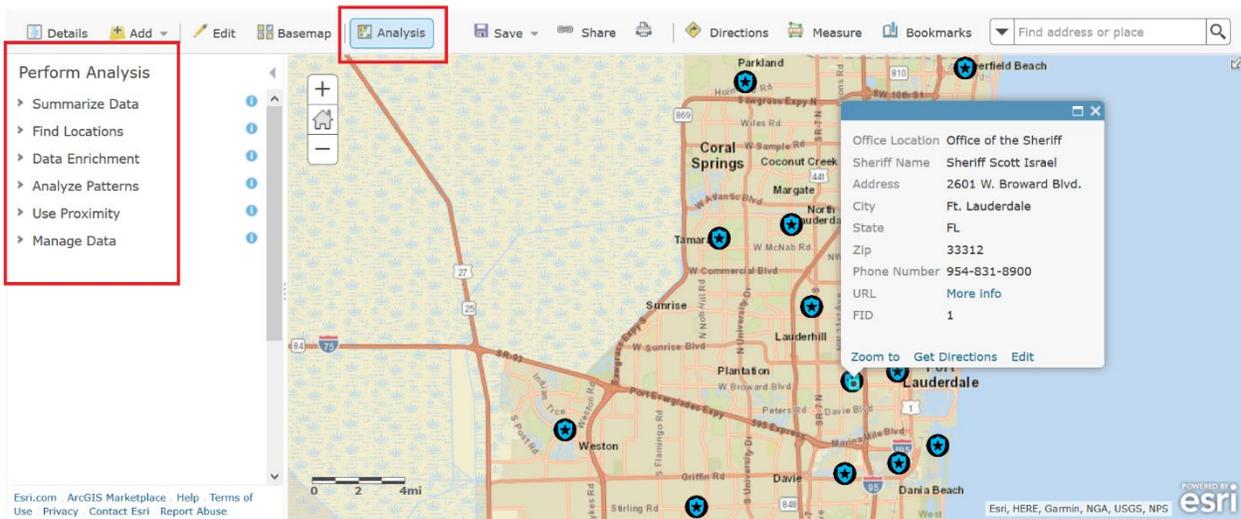


As you can see, Sheriff Scott has lots of territory to cover.

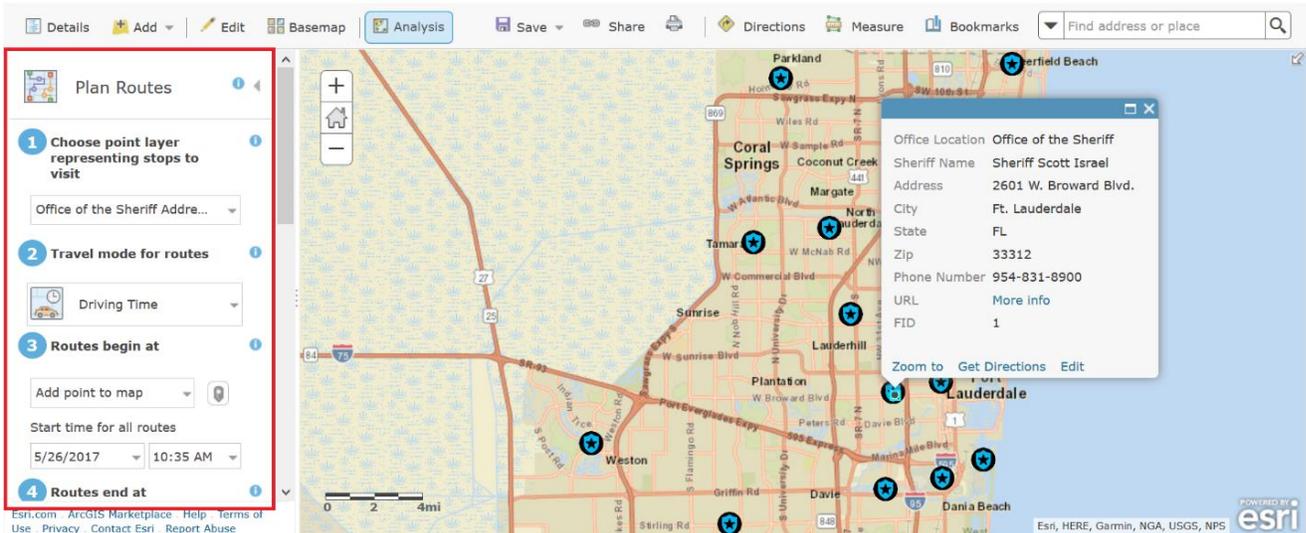
Let's assume he starts from his office and he spends 30 minutes at each location. It will be a long day.

ArcGIS Online will use the attributes of the HERE Map Content to find the optimized route for his visit.

From the menu bar across the top of the map, select the **Analysis** button. You will see an Analysis menu populate the Table of Contents on the left.

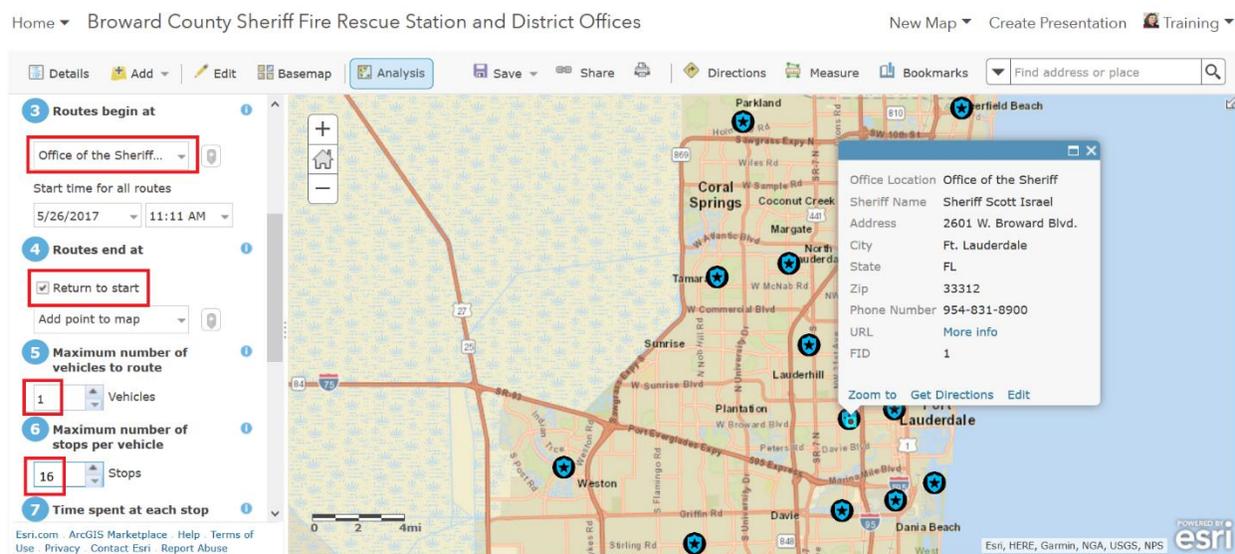


From the menu, click **Use Proximity** and you'll see a drop-down menu appear. Click **Plan Routes**. Now you will be prompted to select your "from" and "to" locations.



- For step 1 of building your route, choose **"Broward County Sheriff Office District Offices"** from the dropdown menu. This defines the district offices as the points you want to be along the route.
- For step 2, ArcGIS assumes that you want a **driving route**, which is correct in this case.
- For step 3, you can create a new point to begin the route, or choose an existing location. We want to choose **Office of the Sheriff** from the dropdown menu, which sets the route to start at Sheriff Scott's office.

- For step 4, check the **Return to Start** option. You'll notice that ArcGIS will then create a new point for the arrival location (Sheriff Scott's office).
- For step 5, specify that we are only interested in **routing 1 vehicle**.
- For step 6, we know that there are 16 district sheriff offices. We can either cap the maximum number of **stops per vehicle to 16** or we can input a number much larger than our desired number of stops to ensure our route is not limited. This field is not quite relevant in this case, but would be in cases with multiple vehicles. However, because this field is required we must input something.
- For step 7, limit the **time spent at each stop to 30 minutes**, since this is the amount of time the Sheriff wants to spend at each office.



Basically, Sheriff Scott will begin his day from his office and visit 16 stations (or “stops”). He will have one vehicle and he will spend 30 minutes at each “stop.” It will be a long day for everyone so we will choose *not* to limit his day to 8 hours for today. You can try to read from the top to see what you are asking ArcGIS Online to do:

“...Route vehicles (Sheriff’s car) to all Broward County Sheriff Office District Offices starting at his office at 8 AM...”

Your route will be generated as a new layer, which ArcGIS automatically names as “Routes to...,” and saves to your account.

Note: If this was a warehouse company distributing food, you probably would have many trucks making many stops during an 8-hour period. You would also probably limit how many stops each truck would make.

To run the process, use the current map extent (make sure you see all 16 stations) and click on **RUN ANALYSIS**.

Home ▾ Broward County Sheriff

Details Add Edit

Your layer has 17 stops.
The current map extent shows 17 stops.

7 Time spent at each stop

30 min 0 sec

8 Limit the total route time per vehicle

8 hr 0 min

9 Result layer name

Routes to Routes to Broward Cou

Include route layers

Save result in cgaldes_napsg

Use current map extent Show credits

RUN ANALYSIS

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Your map should now look like this, with the route displayed and numbers overlaying each stop:

Home ▾ Broward County Sheriff Fire Rescue Station and District Offices

New Map ▾ Create Presentation Training ▾

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

Contents

- Routes to Broward County Sheriff Office District Offices - Assigned Stops
- Routes to Broward County Sheriff Office District Offices
- Office of the Sheriff Address
- Broward County BSO Fire Rescue Stations
- Broward County Sheriff Office District Offices
- World Imagery
- Streets

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Esri, HERE, Garmin, NGA, USGS, NPS

ArcGIS Online has taken all the input and optimized a route for Sheriff Scott Israel. The output is two new layers:

1. **Routes to Broward County Sheriff Office District Offices – Assigned Stops:** This layer is displayed on the map canvas in the color purple. If you look carefully, you can see number 18 and that’s because it counts the beginning and end locations, which are both Sheriff Scott’s Office. If you click on the table icon below this layer, a table will pop up at the bottom of your screen and show you each stop on the route (you may need to scroll to see them all).

Home ▾ Broward County Sheriff Fire Rescue Station and District Offices New Map ▾ Create Presentation 🧑 Training ▾

Service Time (Minutes)	Route Name	Sequence	Travel Time from Previous Stop (Minutes)	Travel Distance from Previous Stop (Miles)	Travel Distance from Previous Stop (Kilometers)	Arrive Time
0.00	1 - Route1	1	0.00	0.00	0.00	5/26/2017, 1
30.00	1 - Route1	2	21.14	18.12	29.17	5/26/2017, 1

2. **Routes to Broward County Sheriff Office District Offices:** This table layer gives you a summary of the entire route. Click the table icon and a table showing the summary information will, once again, pop up at the bottom of your screen.

Home ▾ Broward County Sheriff Fire Rescue Station and District Offices New Map ▾ Create Presentation 🧑 Training ▾

Route Name	Stop Count	Total Time (Minutes)	Total Service Time (Minutes)	Total Travel Time (Minutes)	Total Miles	Total Kilomet
1 - Route1	16	694.90	480.00	214.90	116.66	187.74

The summary table tells us the Sheriff had 16 stops, at which he spent a total of 480 minutes (8 hours!) visiting with personnel. It also tells us that, in total, he traveled 116.6 miles and spent 214.9 minutes driving around Broward County (more than 3.5 hours!). In all, his mission to visit all the offices took him 694.9 minutes, or approximately 11.5 hours to complete!

Step 6: Save Your Work

Click on the **Save** tab to save your work:

Route Name	Stop Count	Total Time (Minutes)	Total Service Time (Minutes)	Total Travel Time (Minutes)	Total Miles	Total Kilometer
1 - Route1	16	694.90	480.00	214.90	116.66	187.74

Note: This new route layer is also now listed in **Content**.

- Home
- Gallery
- Scene
- Groups
- Content**
- Organization

Office of the Sheriff Address

My Content | My Favorites | My Groups | My Organization

+ Add Item | Create

Folders New

- All My Content
- cgaldes_napsg

Item Type

- Maps
- Layers
- Scenes
- Apps
- Tools
- Files

> Date Modified

> Date Created

1 - 2 of 2 in All My Content

Sort by: Date Modified ↓

<input type="checkbox"/>	Title	Modified
<input type="checkbox"/>	 Routes to Broward County Sheriff Office Di... Feature Layer (hosted)	  ... May 26, 2017

Note: If you want to re-run the routing step, you will need to either [delete this layer](#) or [rename the output layer](#) before you can do so.