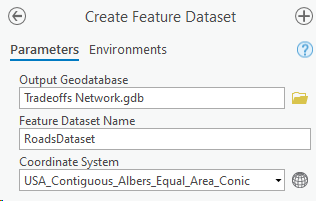
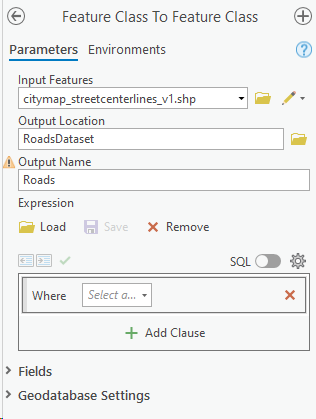
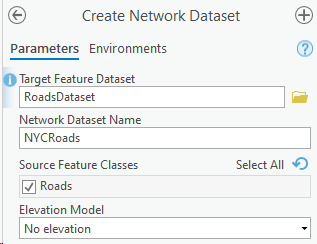
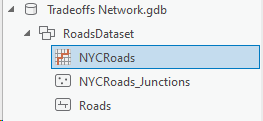
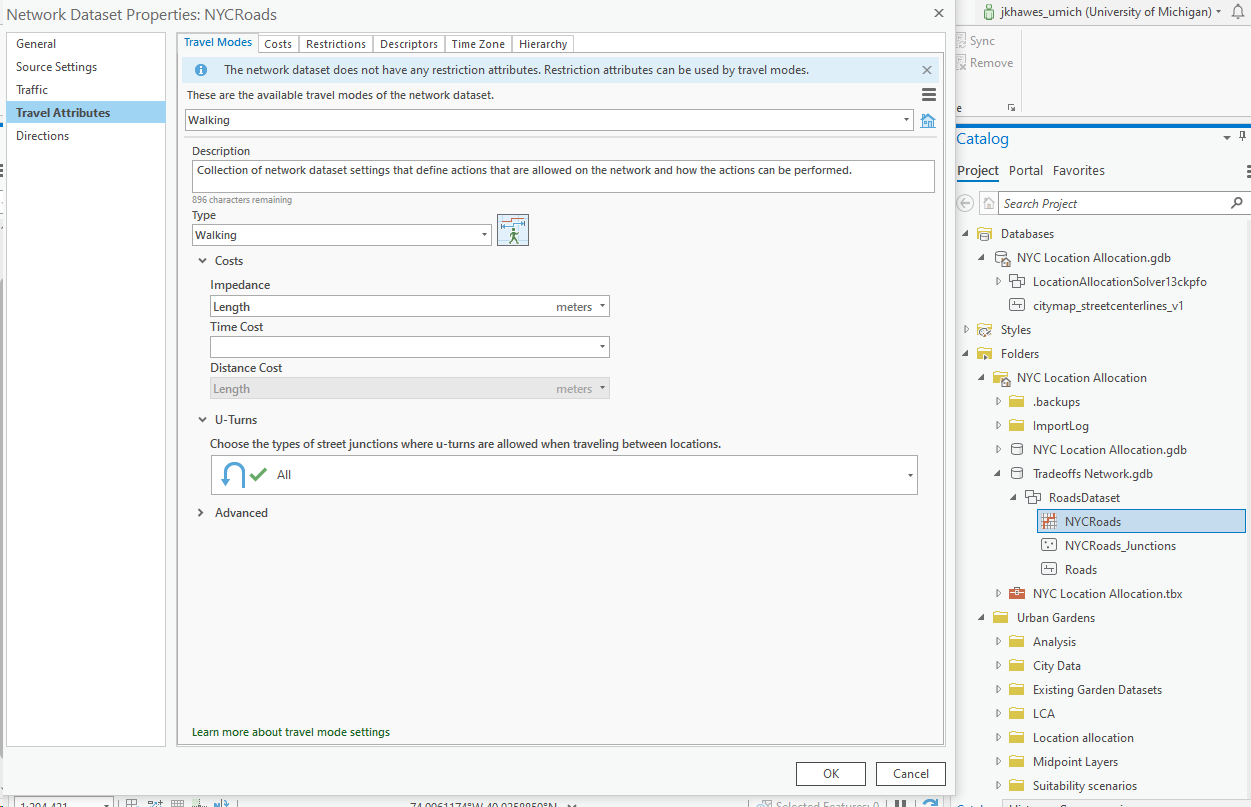
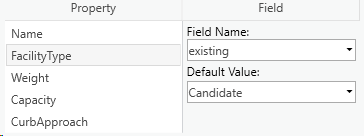
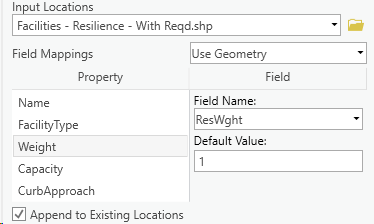
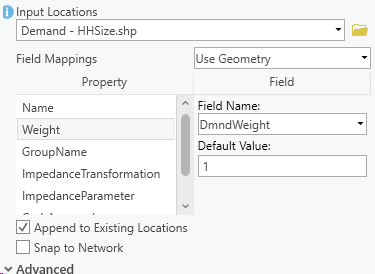
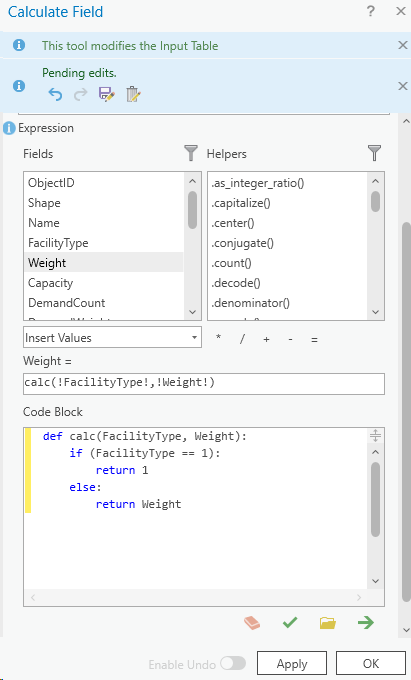
# Location-Allocation and Scenario Analysis

We can use the Network Analyst toolkit to do a lot of work with location-allocation. This has a few basic components:

1. Network - can be a street grid or something similar - must not have major discontinuities
2. Demand points - homes or businesses that will be customers for the new facilities - point layer, so usually centroids – can be weighted for bigger buildings, etc.
3. Facilities - potential and existing facilities - again, centroids. Can have qualities like size.

To build an analysis platform, we can do the following:

1. Start by building the network layer. Because networks can combine multiple types of data, this is actually a pretty complex process even if you only want a very simple network. It’s set up so that you end up with a Feature Dataset that can hold multiple Feature Classes, which then all get combined into the network. As it is, we just need to create a geodatabase to house a Dataset, which we won’t use for anything except our polyline file. None of these steps should take very long. Less than a minute for a simple network of NYC streets..
   1. Create a blank gdb - there's a function in the toolbox called Create File Geodatabase
   2. Create a feature dataset within (right click from catalog -> New -> Feature Dataset … make sure to set projection to 102003)  
      
   3. Import feature class of the road network within there (right click > Import > Feature Class > Find the data you want in the file explorer)  
      
   4. Create a network from that feature class (Create Network Dataset function in toolbox). By default, the network will be created in the same Dataset as the original polyline file.   
      
   5. Edit network properties and add travel mode (Right click on the network in the catalog - not in the display pane)   
      ** >   
      **
   6. Build (Right click in catalog again)
2. Build a Location-Allocation layer
   1. Need the Streets dataset to already exist, which is why we built it first. Basically, just make sure to check the Network Data Source at the top of the Network Analysis dropdown. It should show your NYCRoads network instead of an online portal.
   2. Within the drop-down under Network Analysis, once you’ve verified the network, just click on Location Allocation and it will create a blank layer for you to add data to.
3. Use the [Add Locations](https://pro.arcgis.com/en/pro-app/latest/tool-reference/network-analyst/add-locations.htm) tool to add the Facilities and Demand points - see below for details on this.
   1. This is where you integrate the weighting schemes, although this can also be edited. It will take a while to import the demand points - on the order 2 hours.
   2. Since it takes a while, it’s helpful to get the settings right on the first try. Here’s what you need to do to set the weight and required values. Just check the attribute tables once you’re done to make sure they stuck.
      1. 
      2. 
      3. 
   3. The program may import all required sites with a weight of 0. If it does this, it won’t allocate demand to them correctly. You can use the Calculator in the attribute table viewer to change this. 
4. Make sure all the various settings are correct, including the mode (Walking), the max distance (440m), and the number of facilities (Modeled + Existing = Total Number). Then, click Run. On a strong computer, it should take on the order of 4-6 hours. Export the results and run it again, either with an adjusted number of facilities or a swapped out facility file.