CES463336

Traffic Engineering: Early Merging Versus Zipper Merging Using Autodesk InfraWorks

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Learning Objectives

- Learn how to simulate traffic conditions as vehicles merge early to open lanes at construction zones.
- Learn how to simulate zipper merging traffic conditions and movements at lane closure points.
- Learn how to analyze reporting results for both types of traffic behaviors as traffic is shifted to open lanes during construction.
- Learn how to capitalize on ArcGIS Online Connector for traffic engineering.

Description

Learn how you can use Autodesk InfraWorks to create base traffic models by importing surfaces, roads and real traffic data and defining traffic turning movements. Once the base model is completed, you can use Autodesk InfraWorks Traffic Simulation to create construction proposals to understand how the Level of Service is impacted once lanes are shut down , and how an alternate intersection is created to simulate proper vehicle movements at the turning point.

Speaker

Edmundo Herrera, M.S., P.E. is a Civil Engineer registered as a Professional Engineer in the State of Florida, with a master's degree in Structural Engineering and holding graduate studies at the Massachusetts Institute of Technology related to Transportation Networks and Smart Mobility.

Has more than twenty years of experience with civil engineering projects including software implementations, support, consulting, training and deployment for customers all over the world.

Works for Autodesk, Inc. as a Senior Technical Specialist using Autodesk's AEC Collection presenting, along with sales teams, specialized workflows and sales strategies in roadway, bridge and traffic engineering for Autodesk's Mid-Market, Named and Federal Accounts.

Introduction to Traffic/Mobility Simulation

Autodesk InfraWorks Traffic/Mobility Simulation offers analysis tools that can quantify the economic benefit of a transportation network design, by modeling people traveling within a network.

Unlike other simulators, InfraWorks focuses on movement of both people and vehicles, which makes it the perfect tool for urban design. It is particularly well suited to testing designs where people change between modes, such as designs for Transit Oriented Development (TOD). InfraWorks can be used to analyze transport interchange efficiency, calculating walking time from the interchange to a block. The scenarios function, which is unique in InfraWorks, makes it easier to compare design options with minimum repetitive model building.

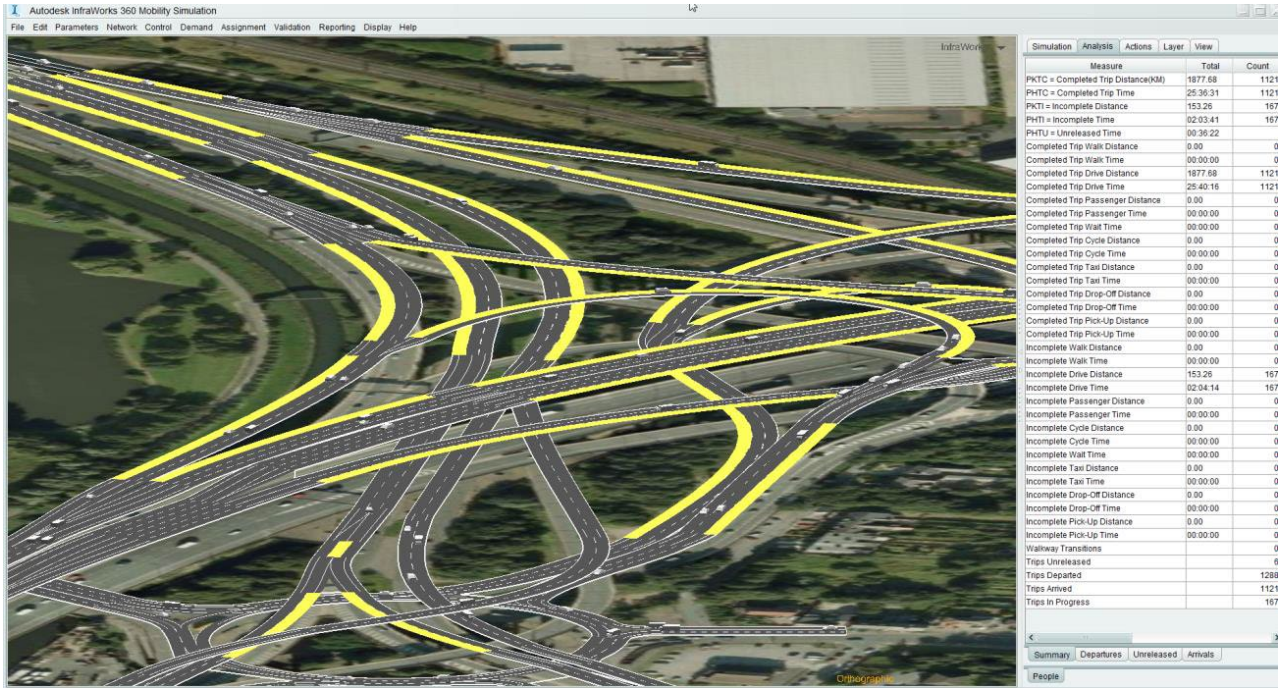
Advantages

1. **Model Integrated Transport: Model People, not just Cars**

In a world that is increasingly congested, with limited space to build more infrastructure, the focus is turning to solutions that move people to the destination by integrating and optimizing the existing transport system. InfraWorks enables a more effective analysis of the system by analyzing demand at the person-trip level, not just by vehicle-trips. This allows the measurement of travel time, distance, stops & emissions and the resultant economic costs and benefits on a per person basis.

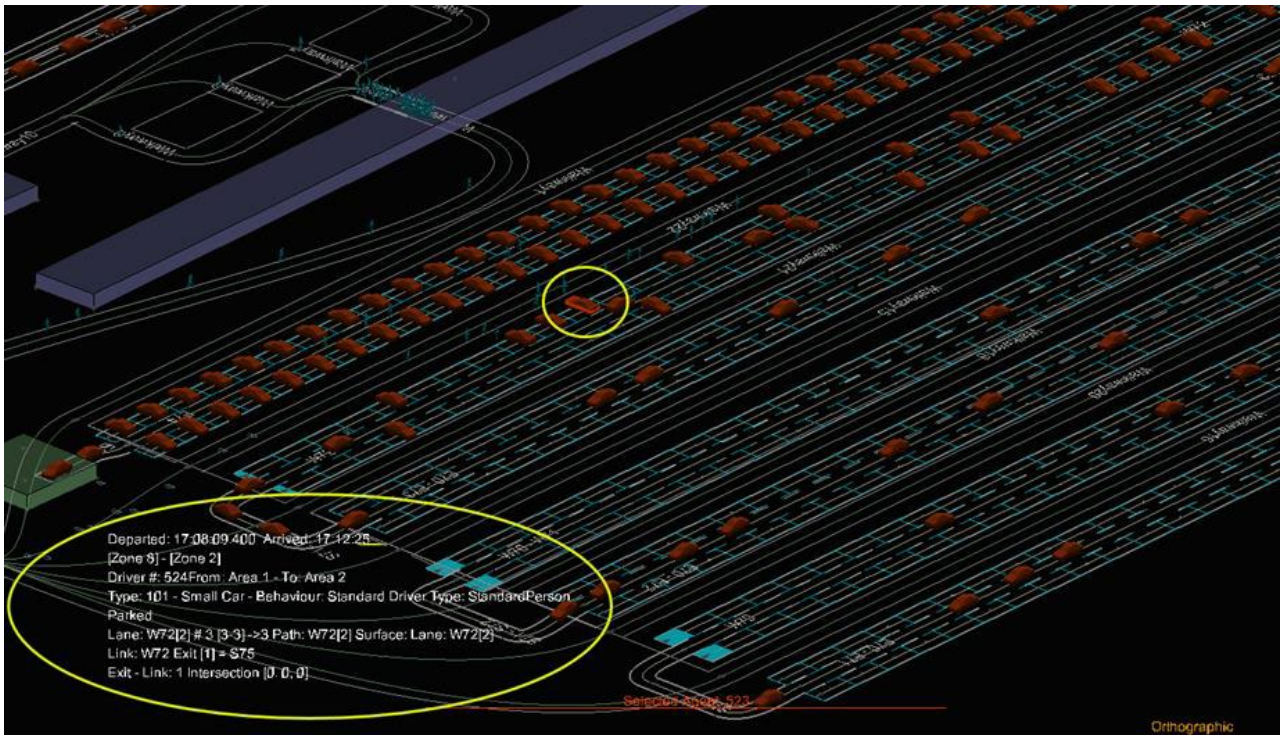
2. **Model Interchanges**

Use InfraWorks to investigate how people transfer from one mode to another, to optimize the layout of the interchange and the timetables, but always focus on using the person as the agent of measurement in the model. Supply an origin and destination for the person, and InfraWorks connects the inward trip on one mode to the transfer and outward trip on another mode, or another vehicle.



3. Model Parking

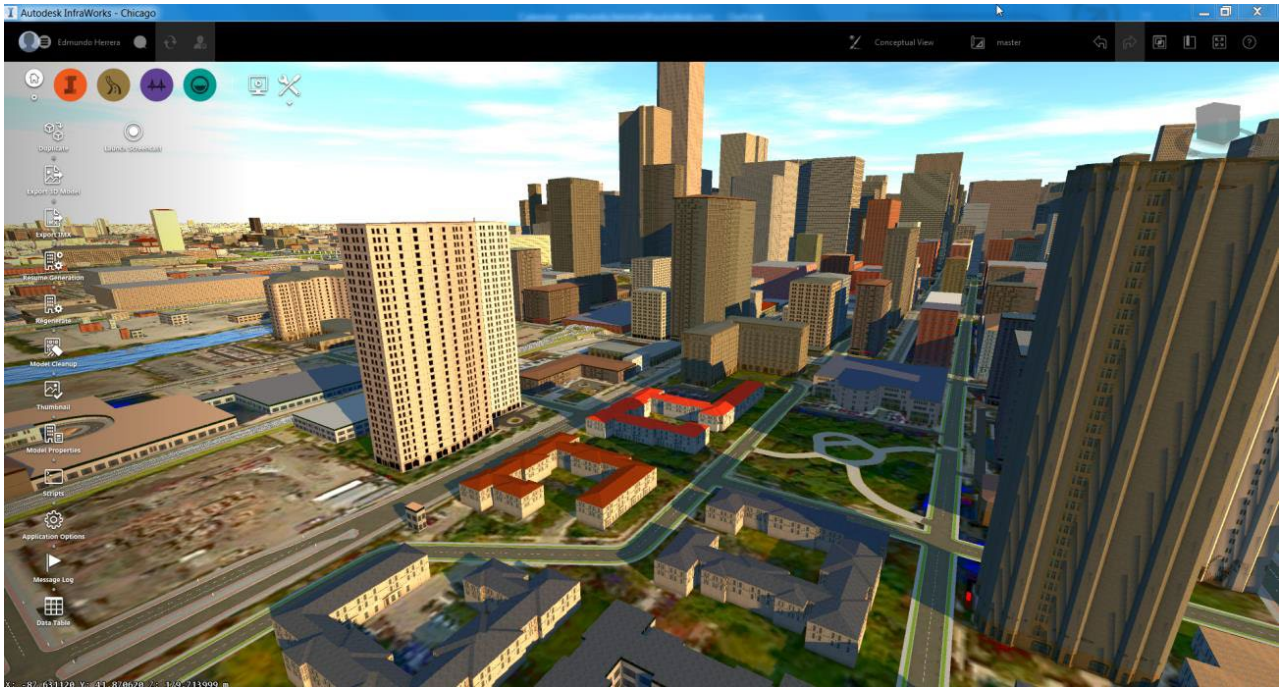
Parking is a mode change that is often forgotten. Every car journey starts and ends in parking of some type. The trip does not end at the gate. How long does it take to find a parking space? How long does it take to walk from the parking space to the exit? What is the maximum occupancy? How much more capacity could be squeezed out of a parking structure with operational improvements – parking guidance systems or occupancy information? These are all questions that can be addressed with InfraWorks Traffic/Mobility simulation.



PARKING SIMULATION - WALKING TIMES, MAX OCCUPANCY, TIME TO REACH CAPACITY

4. Visualize your design

Good planning decisions need good numbers. What are the costs? What are the benefits? Good visualization can bring those numbers to life, make them more accessible to a wider audience. InfraWorks lets users add 3D models of buildings, vehicles and people, to add more realism to the model, and to communicate the benefits more effectively. Elevation maps and aerial photos build realistic terrain, texture maps add detail to any surface. The only limit is your imagination.



AUTODESK INFRAWORKS 3D MODEL

5. High Performance, Higher Productivity

InfraWorks frees the transport analyst to spend more time analyzing models, less time building and running. InfraWorks employs a full 3-D point and click interface: the user can click to select any object, or any combination of objects at any time. Advanced geometrical features, such as 3D spline curves allow more realistic models, incorporating variable curved gradients and realistic spiral-like curves.

6. Collect results directly to spreadsheets

InfraWorks can generate results in a variety of formats, including CSV and XLS. These can be used in interactive mode or combined with batch-file interface to increase productivity by generating the required results directly in the required format.

7. **Repeatable Input**

InfraWorks isolates random trip generation from the simulation loop. Trips are generated once, before the simulation begins, and the sequence of trips is saved for re-use. This means that the same sequence of trips can be replayed with any variation of the model, including base and all proposed designs. If a change in output is detected in a design, compared to a base model, users can say for certain that the change in measured results was a direct consequence of the changes to the design model, not due to a change in the sequence of random numbers used to generate trips.

Conventional Merging vs Zipper Merging in Construction Zones using Autodesk Traffic Simulation

Using ArcGIS Online, users can create customized maps by importing a State's DOT GIS Portal Traffic data. Once created, and by opening a model in InfraWorks, traffic data can then be imported directly into the model where road geometry and traffic counts can then be leveraged by running MicroSimulations in InfraWorks.

Multiple MicroSimulation proposals can then be created to simulate existing traffic conditions using real AADT traffic counts and then analyze behaviors using Conventional merging and study the differences against Zipper Merging at any location with real traffic data.

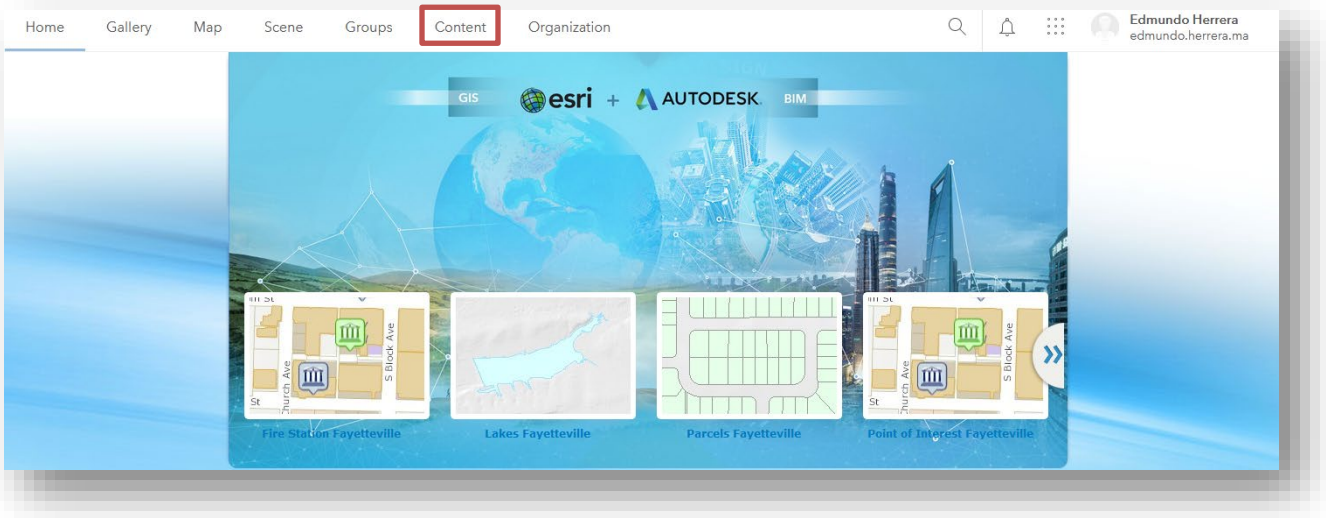
Creating Custom Map in ArcGIS Online with real traffic data

We'll be analyzing how vehicles merge using both conventional and zipper merging behaviors on the Southbound direction along Interstate 25 in Albuquerque, New Mexico when a lane is closed due to maintenance/repair works:

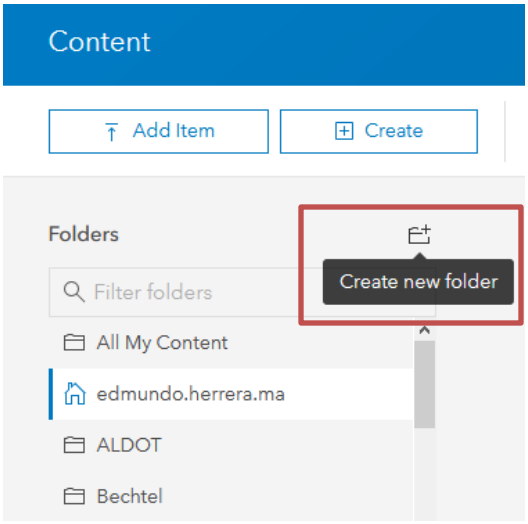
US HWY 85 & TRAMWAY RD NE COURTESY: GOOGLE EARTH

1. Sign into ArcGIS Online using proper credentials:

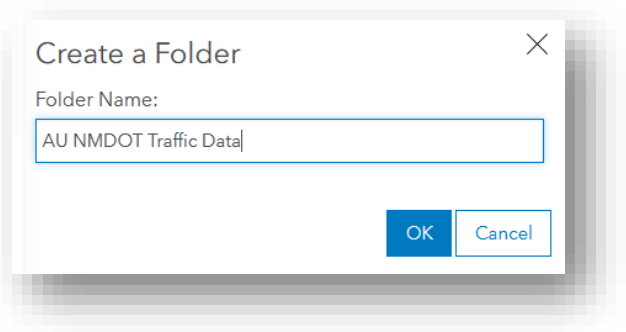
2. Select the Content tab to create a custom folder. A custom map will then be created and stored in the project's directory using the State's traffic count data:



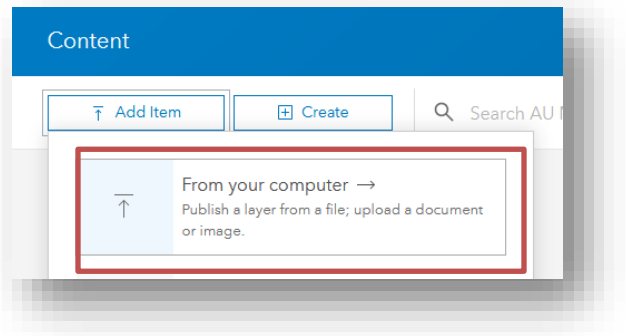
3. In the Content section, under Folders, select the icon to the right, Create new folder:



4. Type in, under Folder Name, AU NMDOT Traffic Data, select OK:

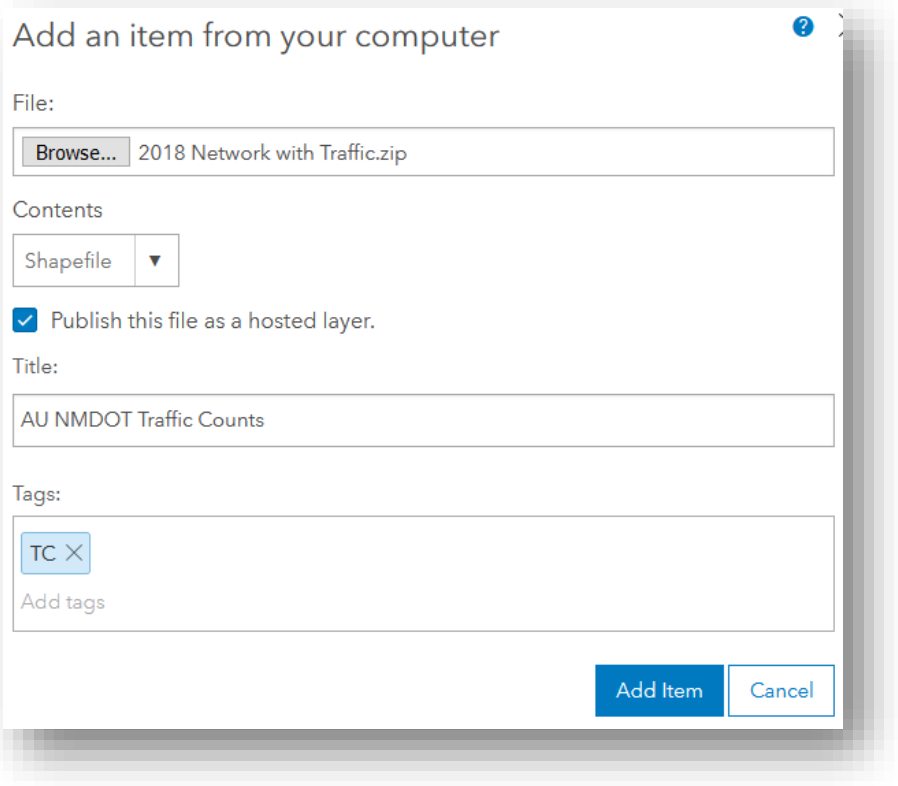


5. Now select, under Add Item, From your computer

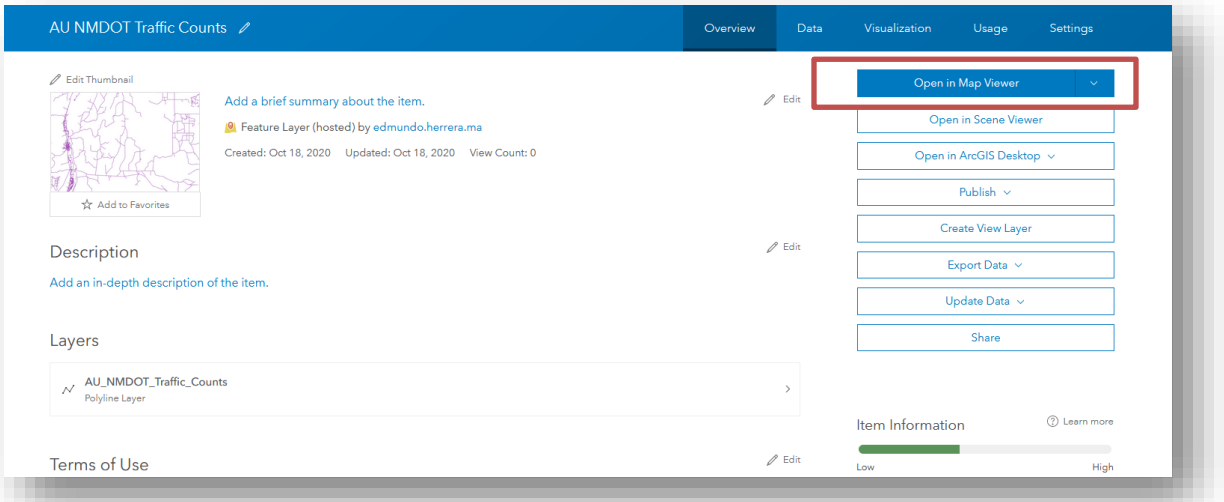


NOTE: A SHAPE FILE WITH TRAFFIC DATA WILL BE IMPORTED. HOWEVER, TRAFFIC DATA CAN BE IMPORTED BY USING A STATE'S DOT GIS PORTAL IN A VARIETY OF WAYS: WMS, ARC GIS SERVER WEB SERVICE, KML, WFS, ETC.

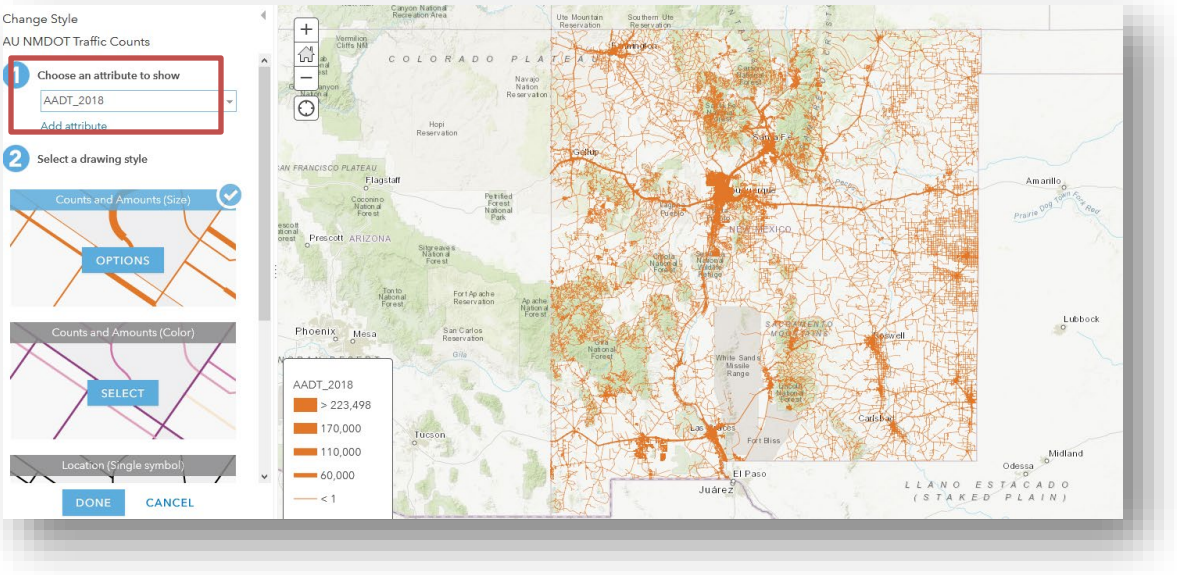
6. Under the File section, browse and select the 2018 Network with Traffic.zip file delivered with the training documents for this class. Under Contents, select Shapefile, turn on Publish this file as a hosted layer. Under Title, type AU NMDOT Traffic Counts and type TC in the Tags section. Select Add Item.



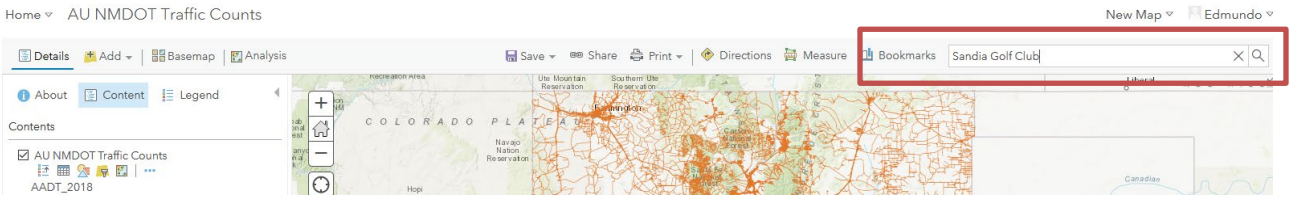
7. The layer is created. From the right side of the window, select Open in Map Viewer:



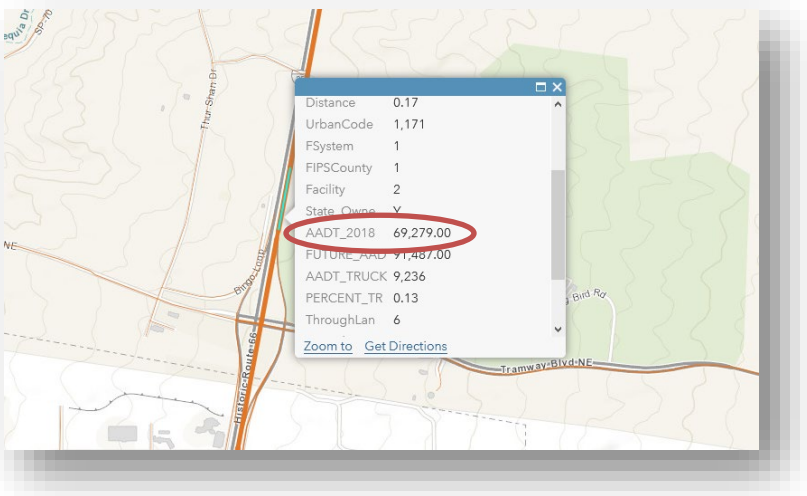
8. In the Change Style section on the left side, select under Choose an attribute to show, AADT_2018. Once the map is updated, select Done on the bottom left part of the window:



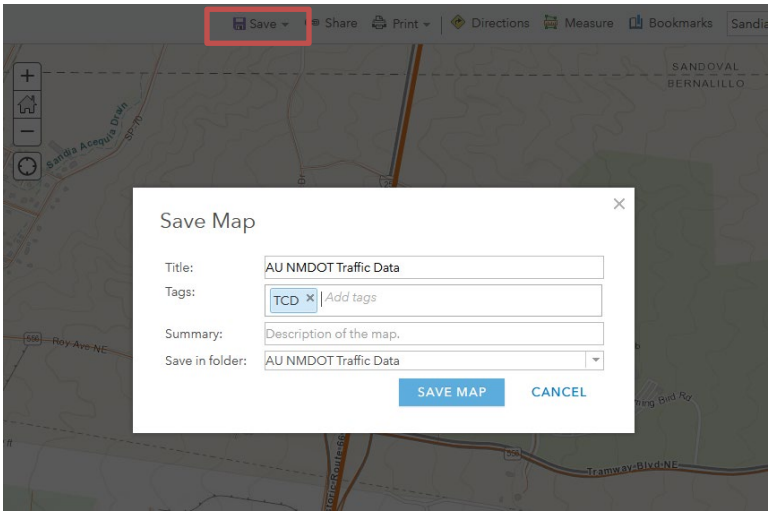
9. Type in Sandia Golf Club next to Bookmarks:



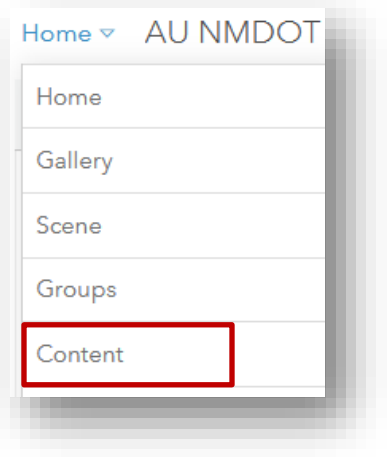
10. The map zooms into the proper location. Click anywhere along the Interstate. The AADT 2018 value is displayed in the Pop-up window. Close the window.



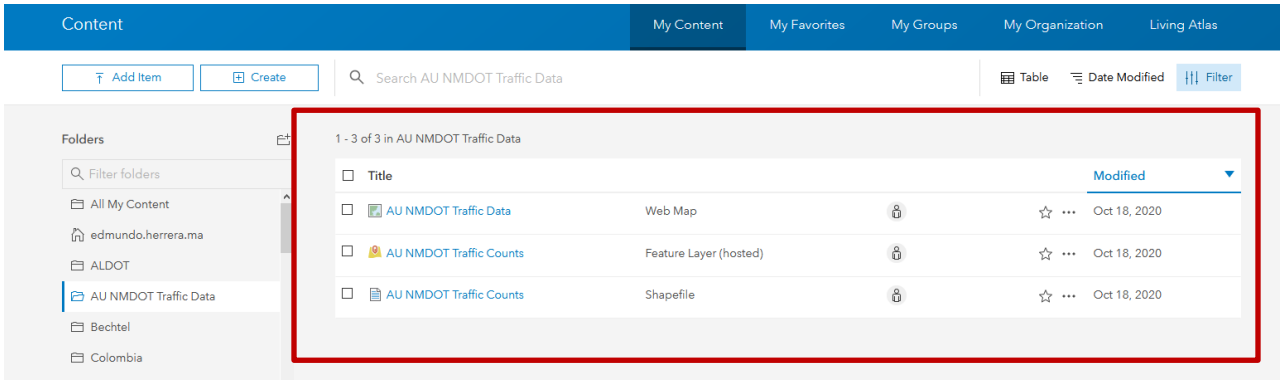
11. Select Save. On the Save Map dialog box, under Title, type AU NMDOT Traffic Data. Type TCD under Tags, verify that the map will be saved in the proper folder, AU NMDOT Traffic Data and select Save Map.



12. From the Home Section, select Content.

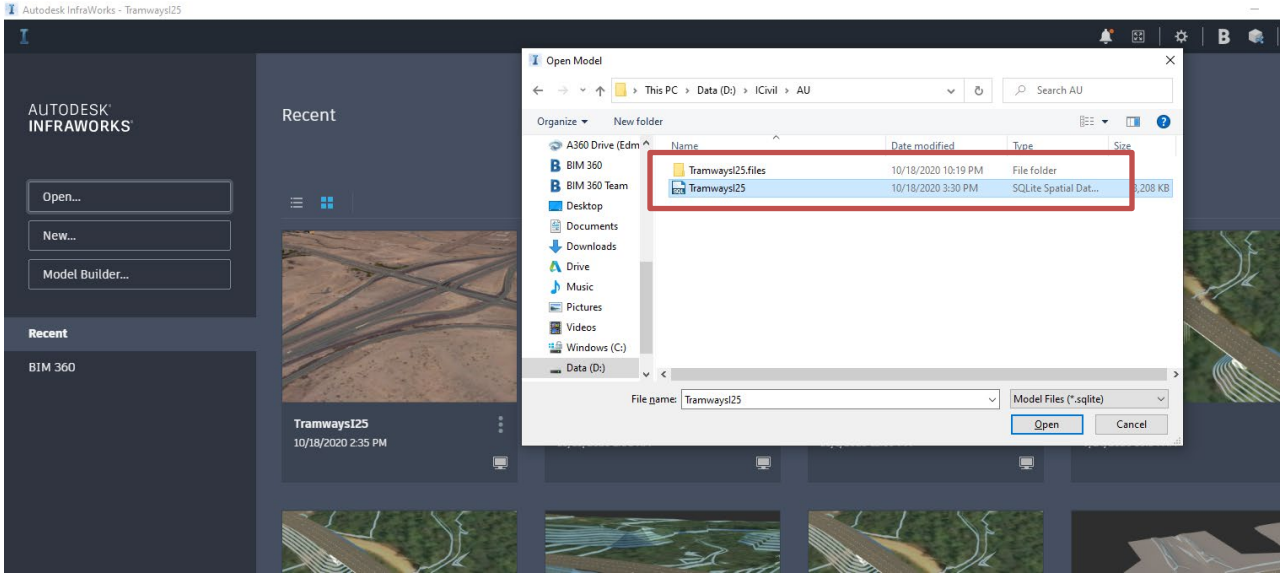


13. The map is displayed on the AU NMDOT Traffic Data folder along with the Feature Layer and Shape File:



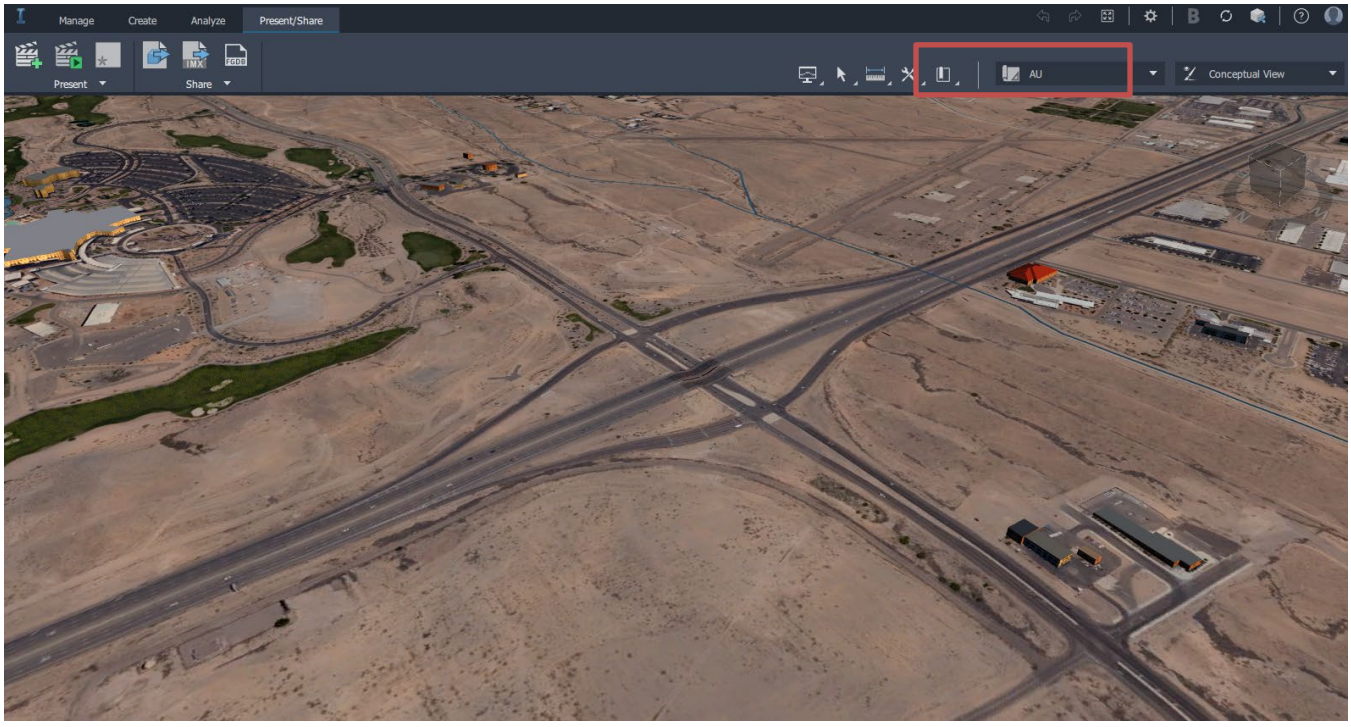
Importing ArcGIS Online Traffic Data into InfraWorks

1. Using Autodesk InfraWorks, under Open, select the Tramwaysl25.sqlite file delivered with the Training Documents for this class:

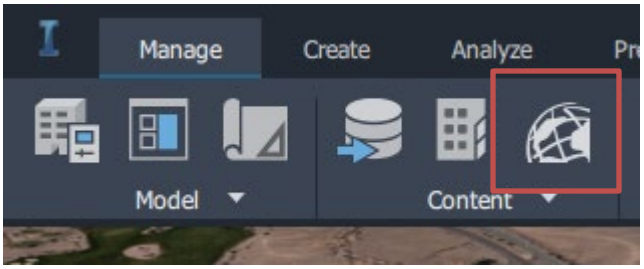


NOTE: INFRAWORKS MODELS CAN BE CREATED USING MODEL BUILDER OR FROM AN EMPTY DESIGN TEMPLATE WITH AN APPROPRIATE COORDINATE SYSTEM

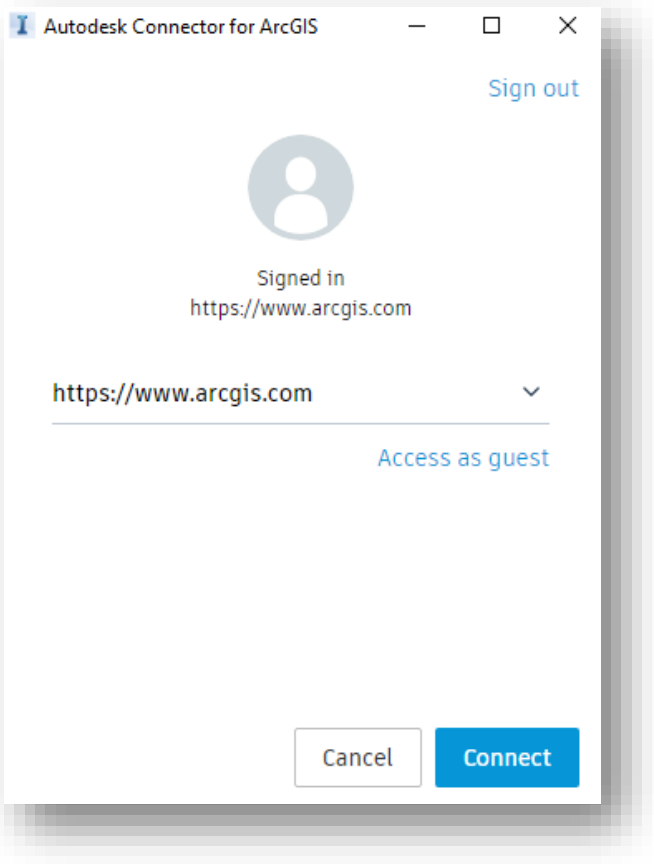
2. The active proposal (AU) in the model only contains an aerial image and a base surface:



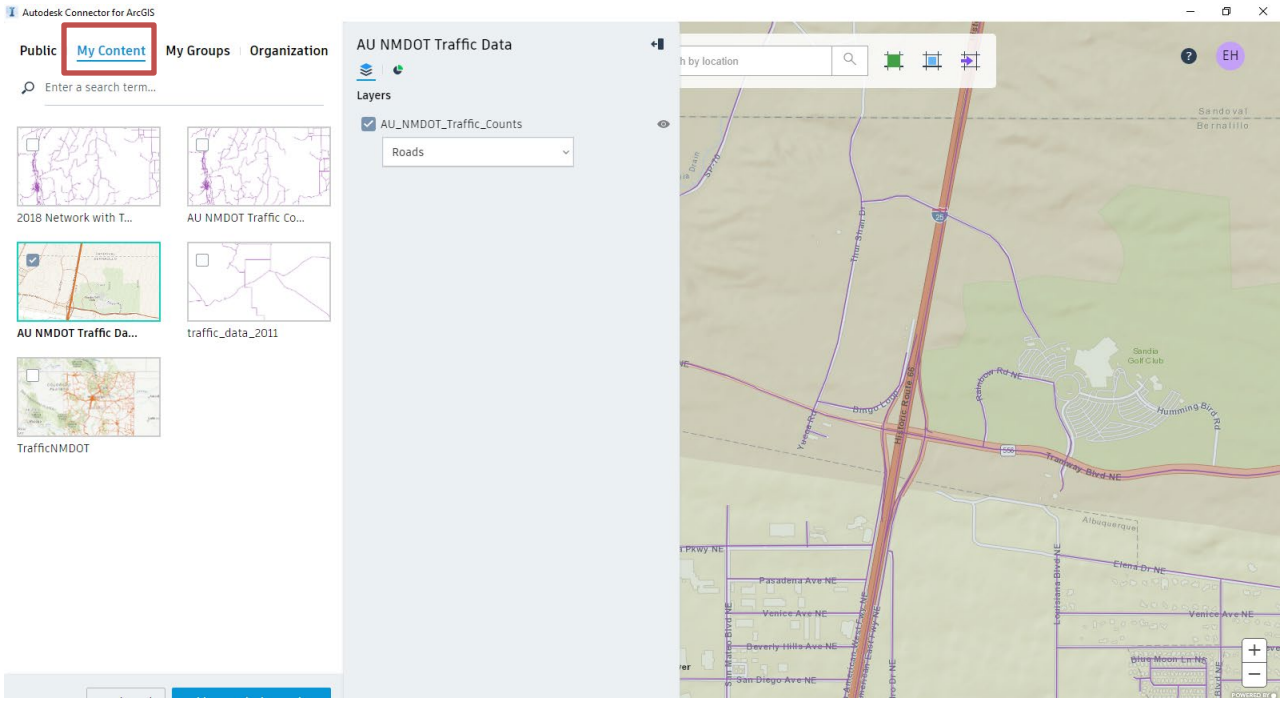
3. From the Manage tab, under Content, select the Autodesk Connector for ArcGIS:



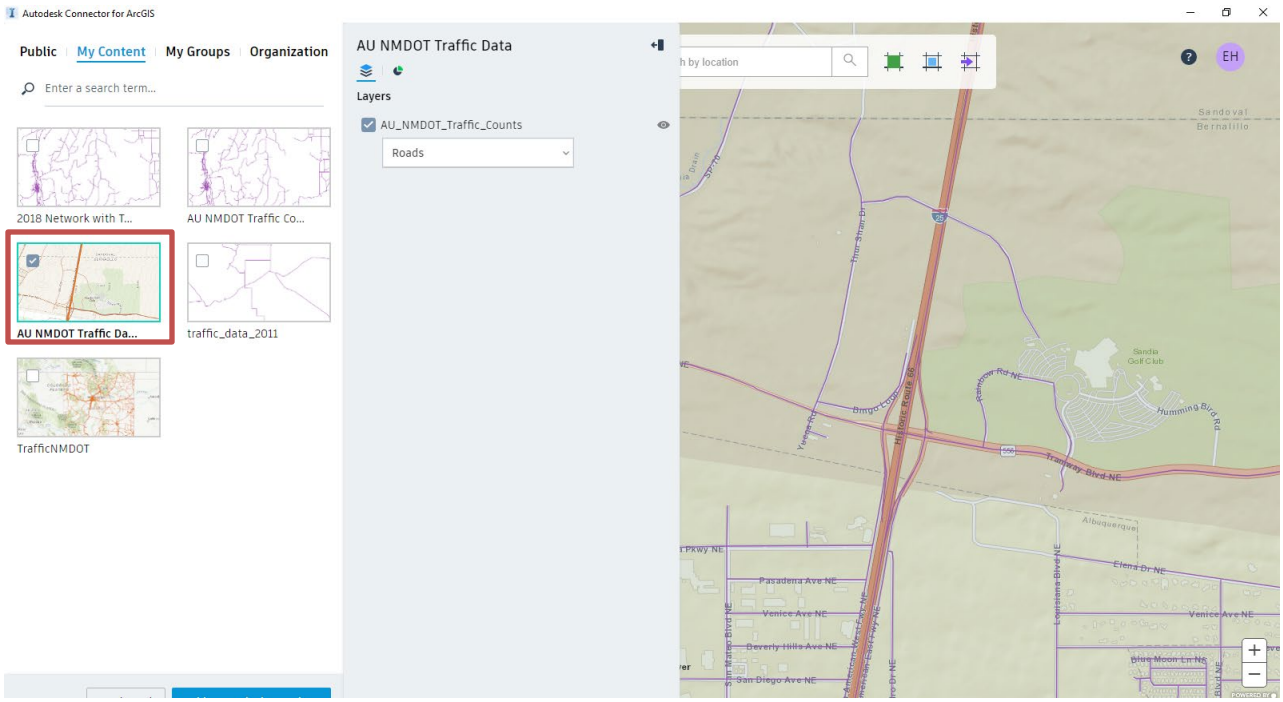
4. Type in proper credentials to access ArcGIS Online, select Connect:



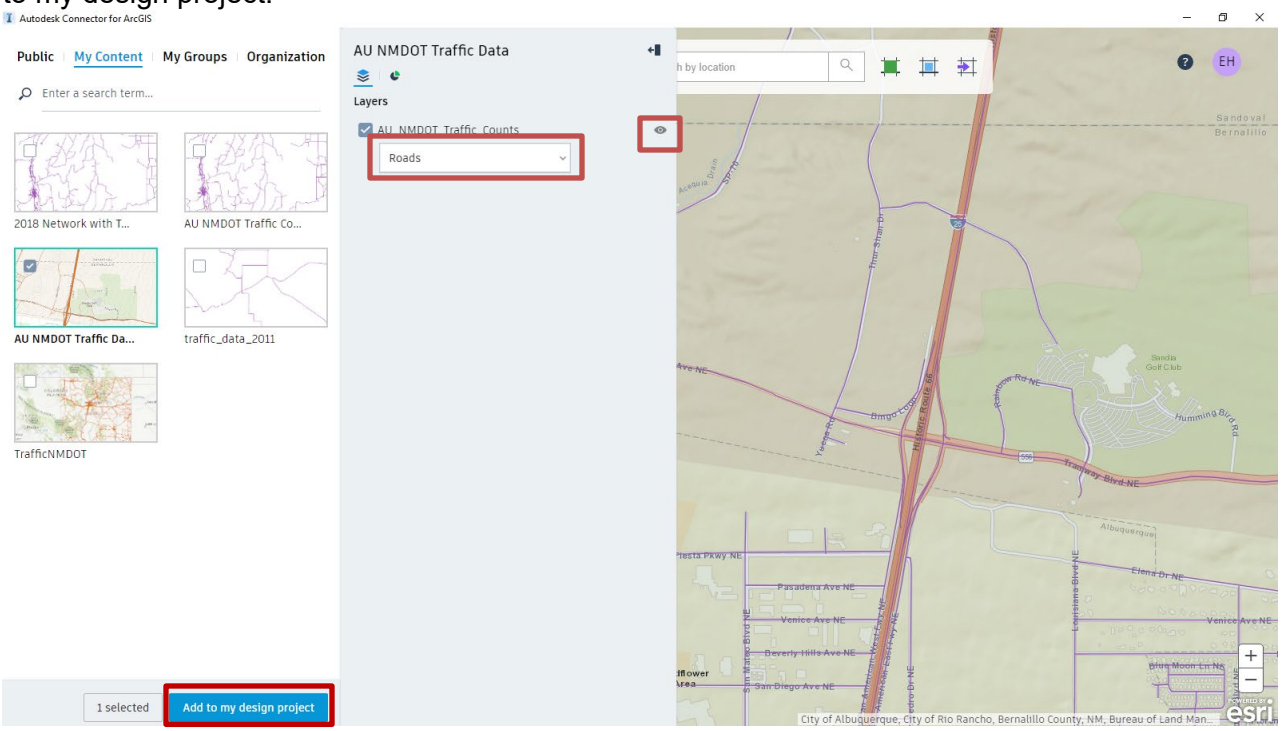
5. At the Autodesk Connector for GIS window, select the MyContent tab:



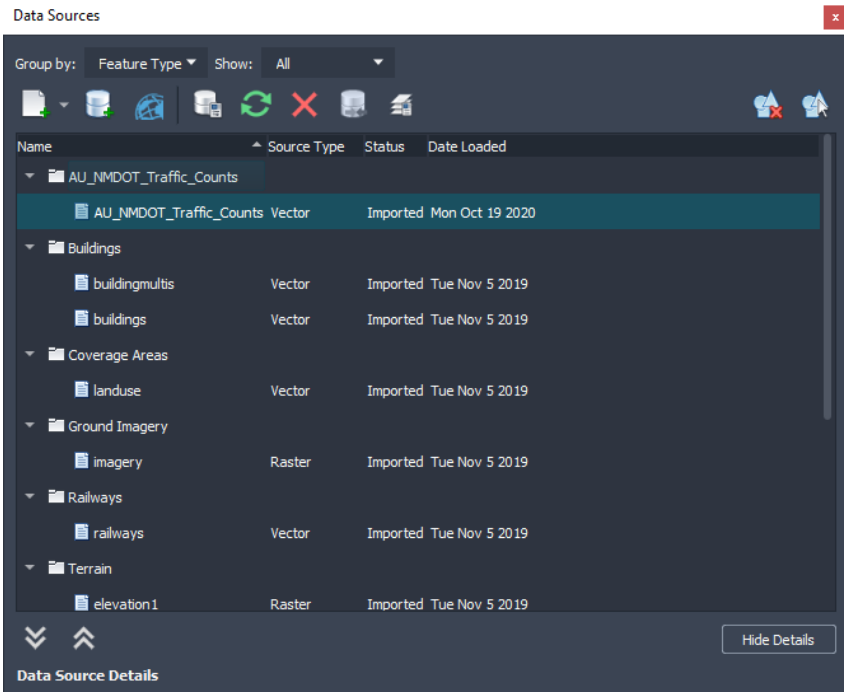
Turn on the AU NMDOT Traffic Data Web Map:



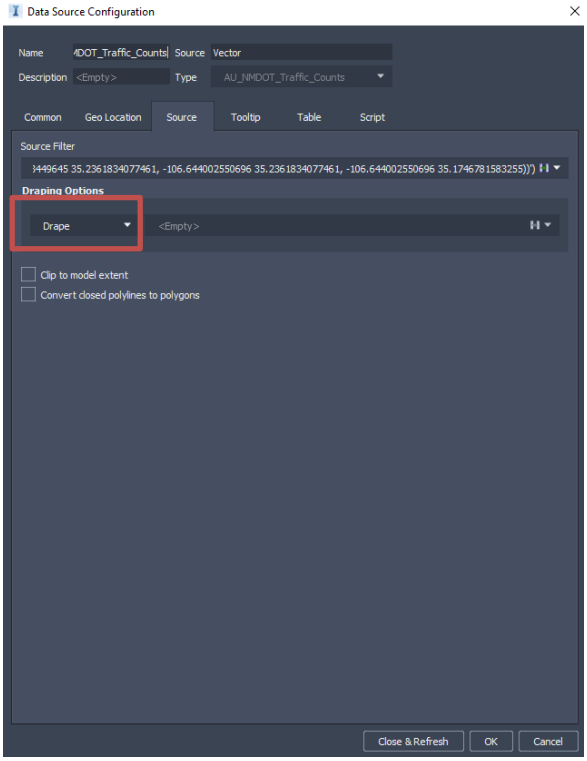
Select the eye icon and under Layers, select Roads. At the bottom of the window, select Add to my design project:



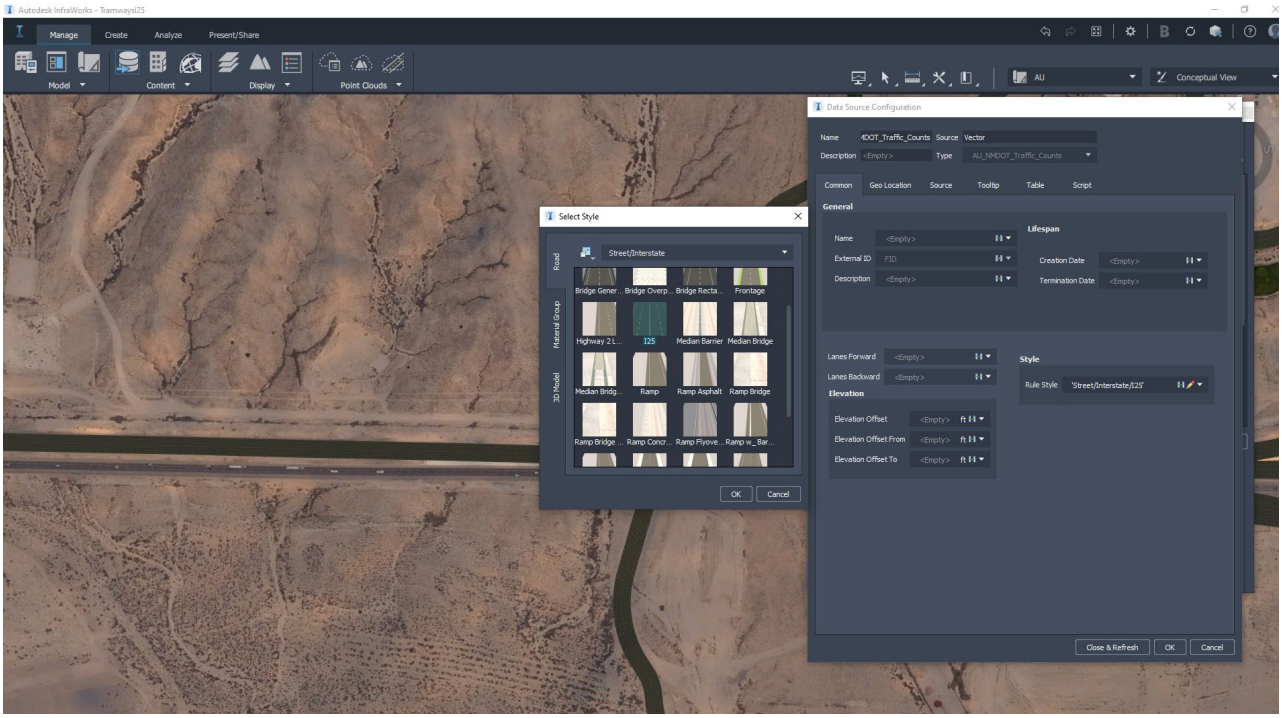
The layer is imported as Roads into the InfraWorks Model:



6. Double click on AU_NMDOT_Traffic_Counts to configure road elevations. Select the Source tab and under Draping Options, select Drape.

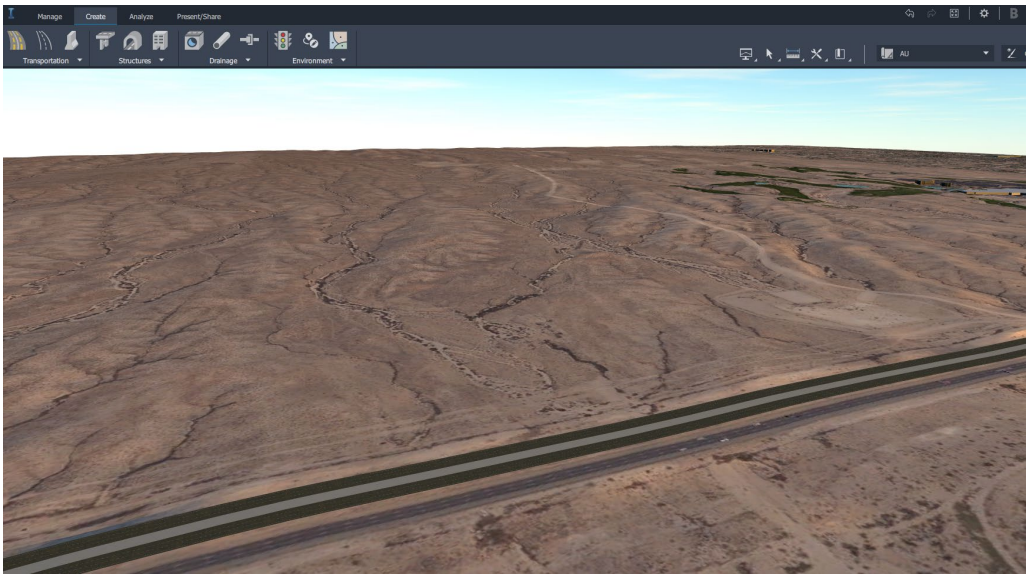


7. Select the Common tab, and under Style, select the pencil icon to choose a proper style for the Interstate, select the I25 style delivered with the model. Select Close & Refresh.



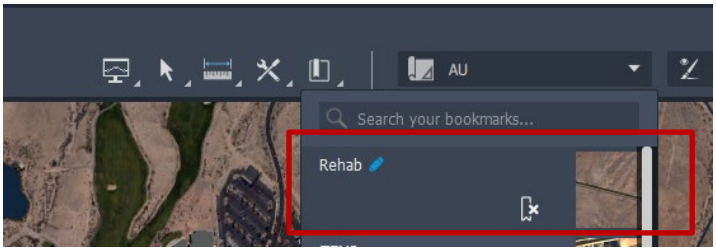
NOTE: USERS CAN CREATE CUSTOM STYLES DEPENDING ON THE NATURE OF THE ROADS (RAMPS, 2 LANE ROADS, INTERSTATES, FRONTAGE ROADS, ETC.). SINCE WE WILL ONLY BE ANALYZING THE INTERSTATE, ASSIGNING ONE STYLE TO EVERY ROAD WILL BE IRRELEVANT. HOWEVER, KEEP IN MIND THAT IF ALL ROADS ARE TO BE CONSIDERED, THEN PROPER STYLES SHOULD BE ASSIGNED TO ALL ROADS IN THE NETWORK.

Roads are imported to the model:

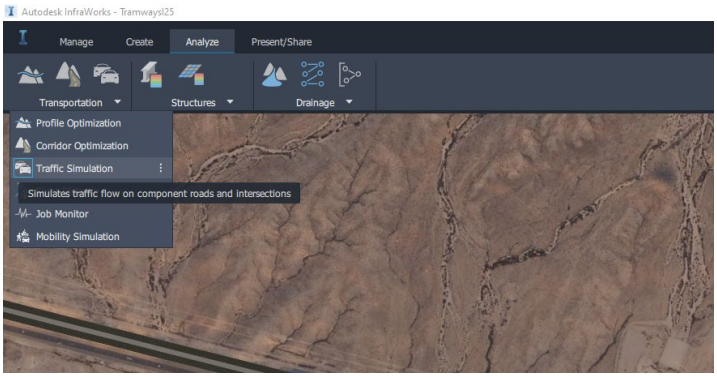


Traffic Simulation – Existing Conditions

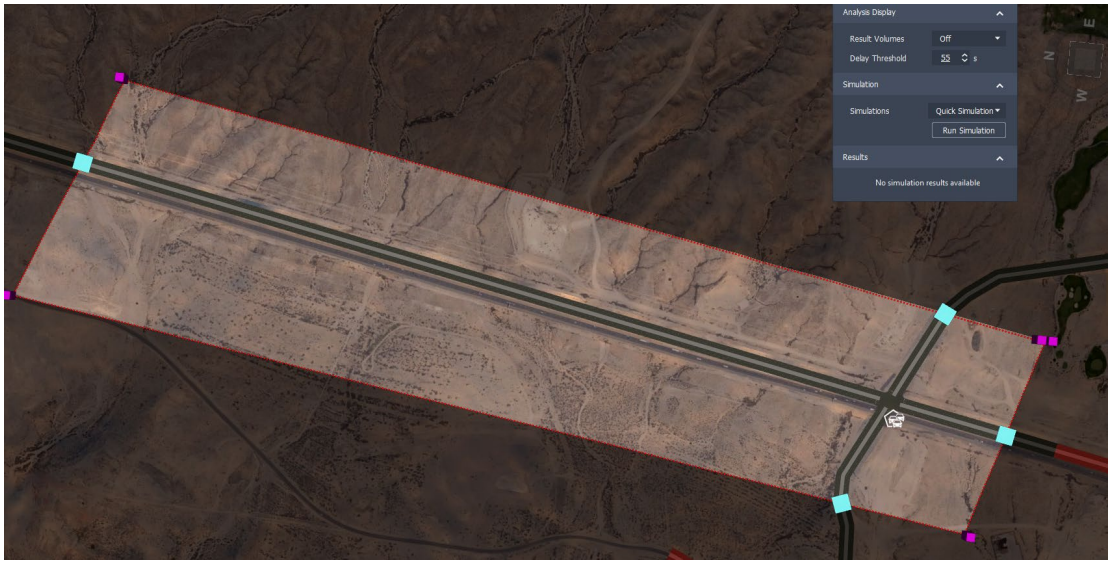
1. From the Main InfraWorks, ribbon, select the Rehab bookmark



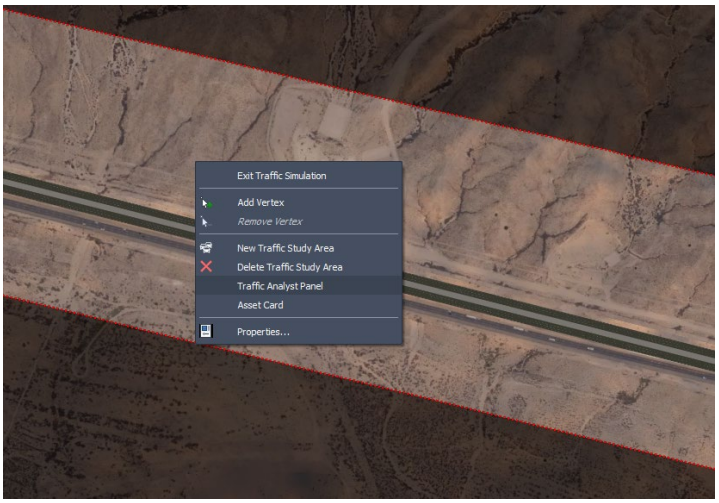
2. From the InfraWorks Analyze tab, select Traffic Simulation:



3. Users will now be prompted to click inside the model to define a New Traffic Study Area. Place four points around the interstate on the left side of the model to form a polygon study area, double click on the last point to finish creating the area. Make sure an intersection is included in the area. Select OK twice when prompted to convert Planning Roads to Component Roads and when informed that Component Roads can't be reverted to Planning Roads.

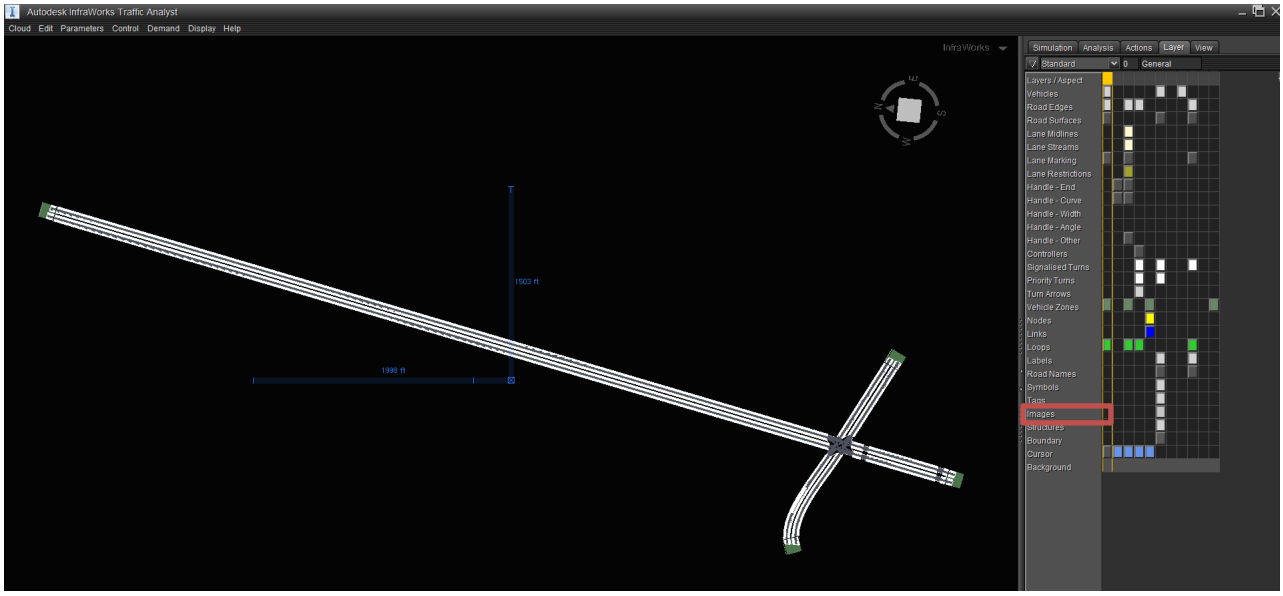


4. Once the area has been created, right click in the model and select Traffic Analyst Panel. Select OK if a message appears as Traffic Analyst opens:

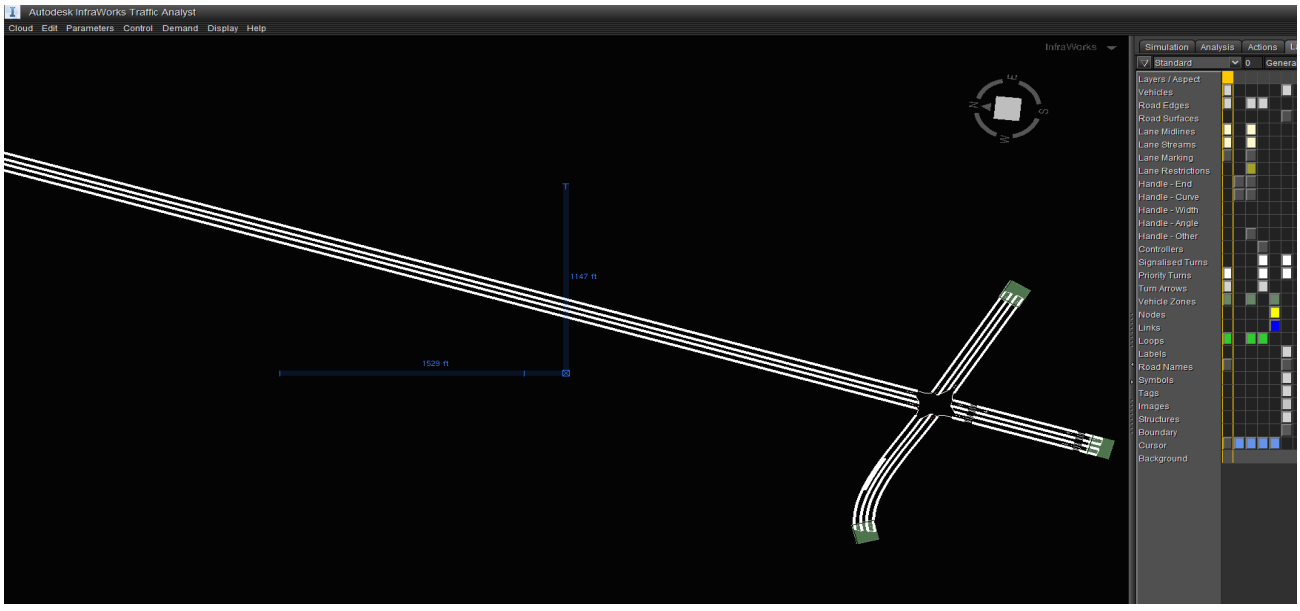


Traffic Analyst opens. It is designed for simulation of vehicles moving on a network of roads. By changing parameters and variables, predictions may be made about the behavior of the road network. Computer simulation is often used to model systems for which simple closed form analytic solutions are not possible. A simulation generates a sample of representative scenarios for a model in which a complete enumeration of all possible states would be prohibitive or impossible. Graphical computer simulations provide the added benefit of visualization of the system as it changes over time.

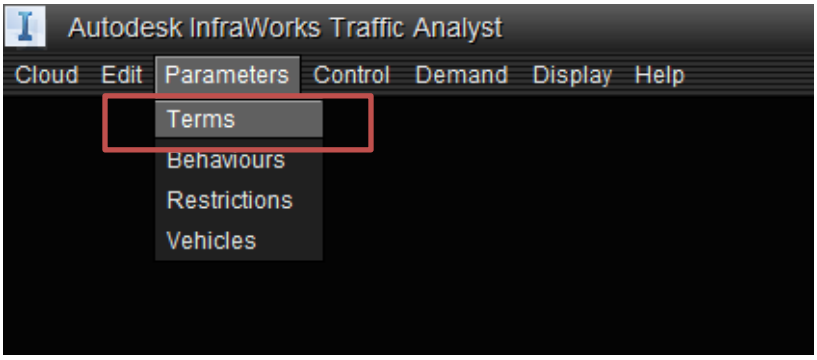
5. Since the image is irrelevant and gets in the way of understanding traffic, we will begin by turning it off. From the right side, select the Layer tab, click on Images to turn off the image:



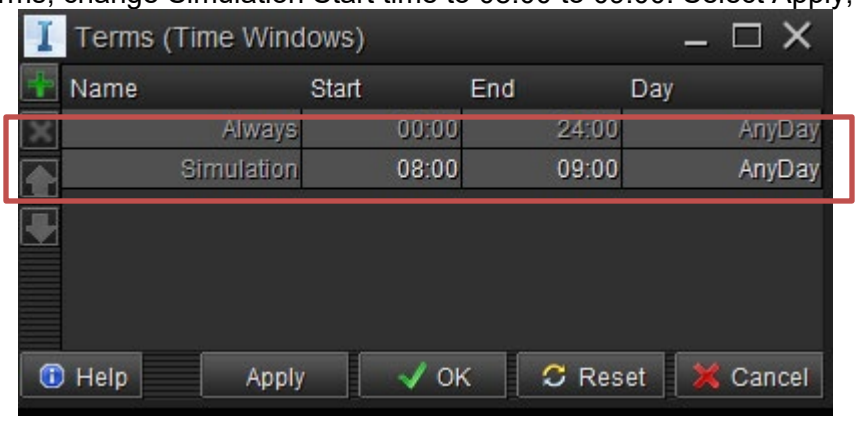
6. On the same Layer tab, turn off Road Surfaces and Turn on Road Names, Lane Midlines and Lane Streams:



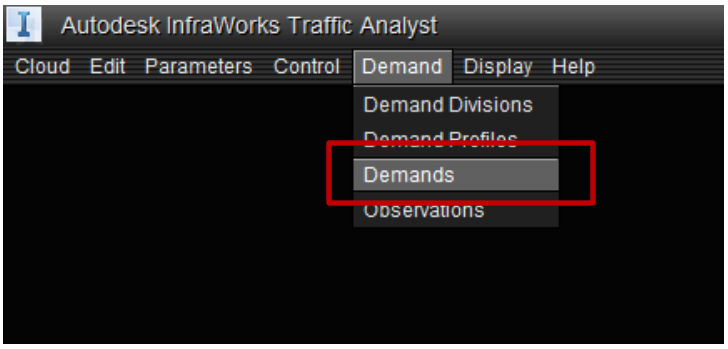
7. From the Autodesk InfraWorks Traffic Analyst menu, select the Parameters tab, select Terms:



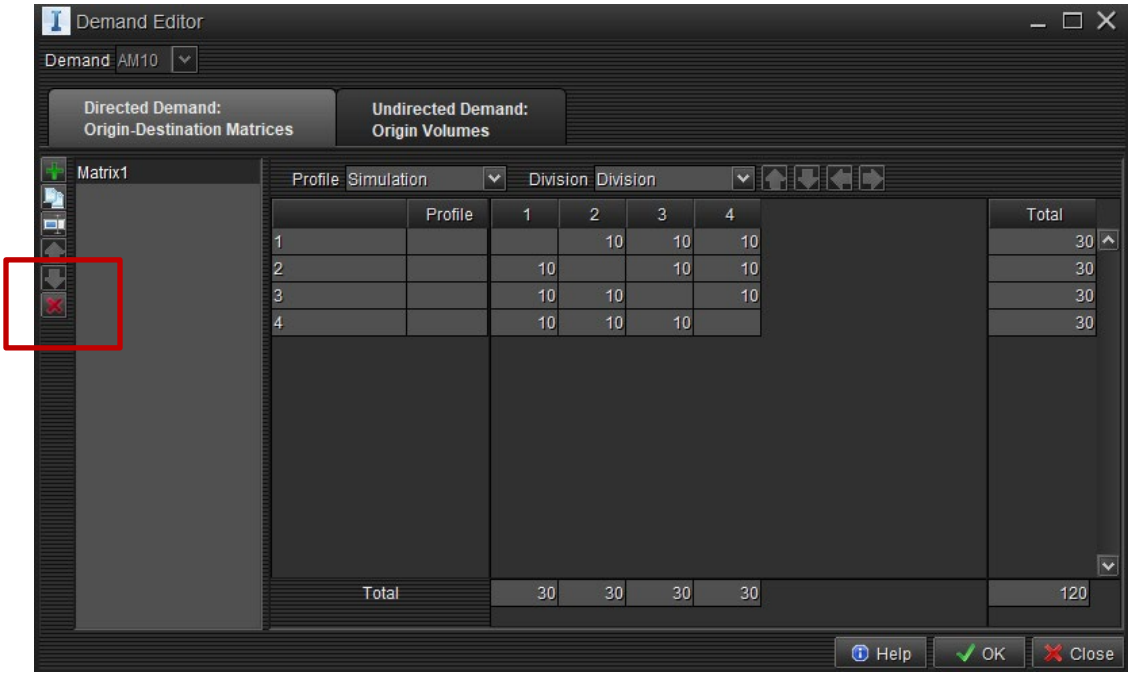
8. Under the Terms, change Simulation Start time to 08:00 to 09:00. Select Apply, OK:



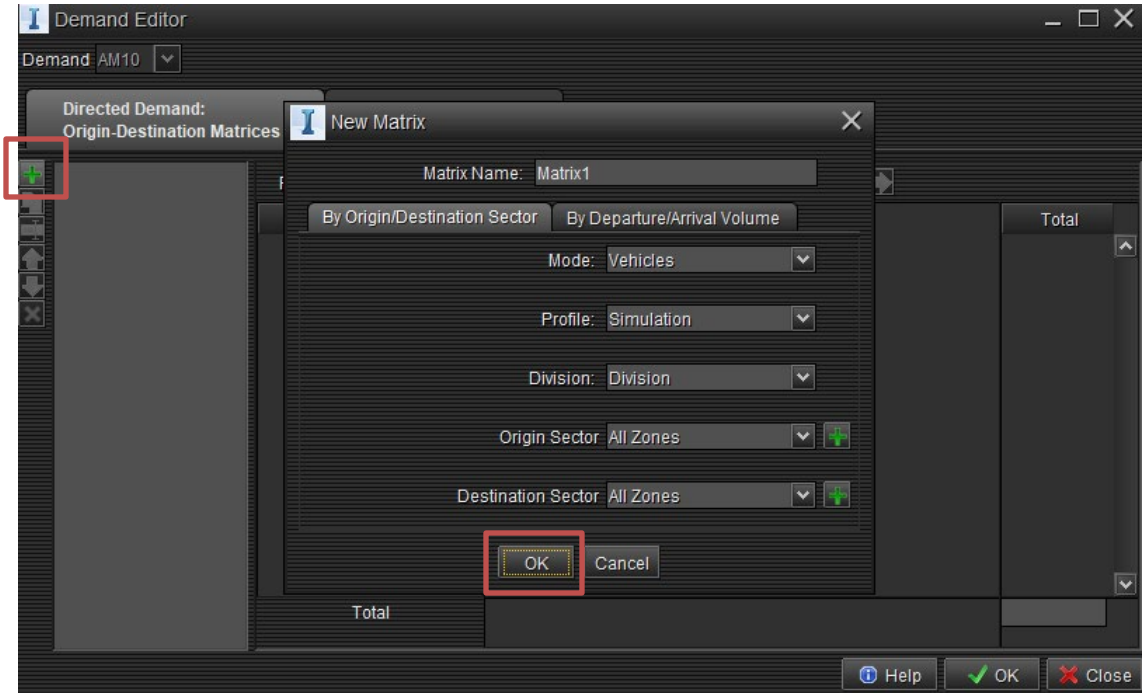
9. From the Autodesk InfraWorks Traffic Analyst menu, select the Demand tab, select Demands:



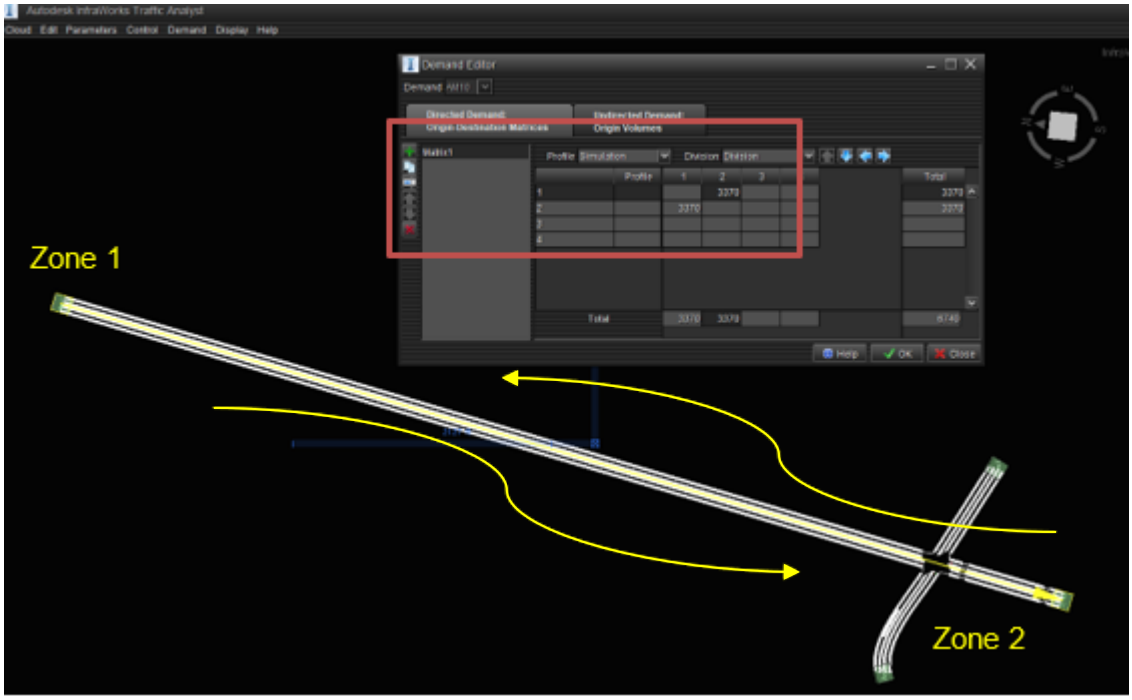
10. The Demand Editor dialog box appears. Select the X icon to delete the default Matrix, Matrix 1:



11. Select the + Sign icon on the left side. Select OK on the bottom of the dialog box:

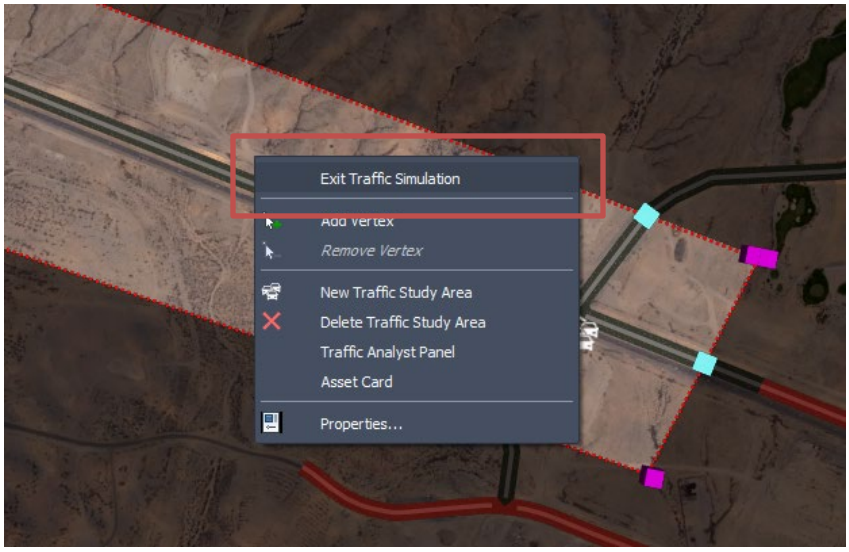


12. Since we will only be simulating traffic on the Interstate, type in 3370 on the Zone 1 to Zone 2 box and 3370 on the Zone 2 to Zone 1 box. Select OK:

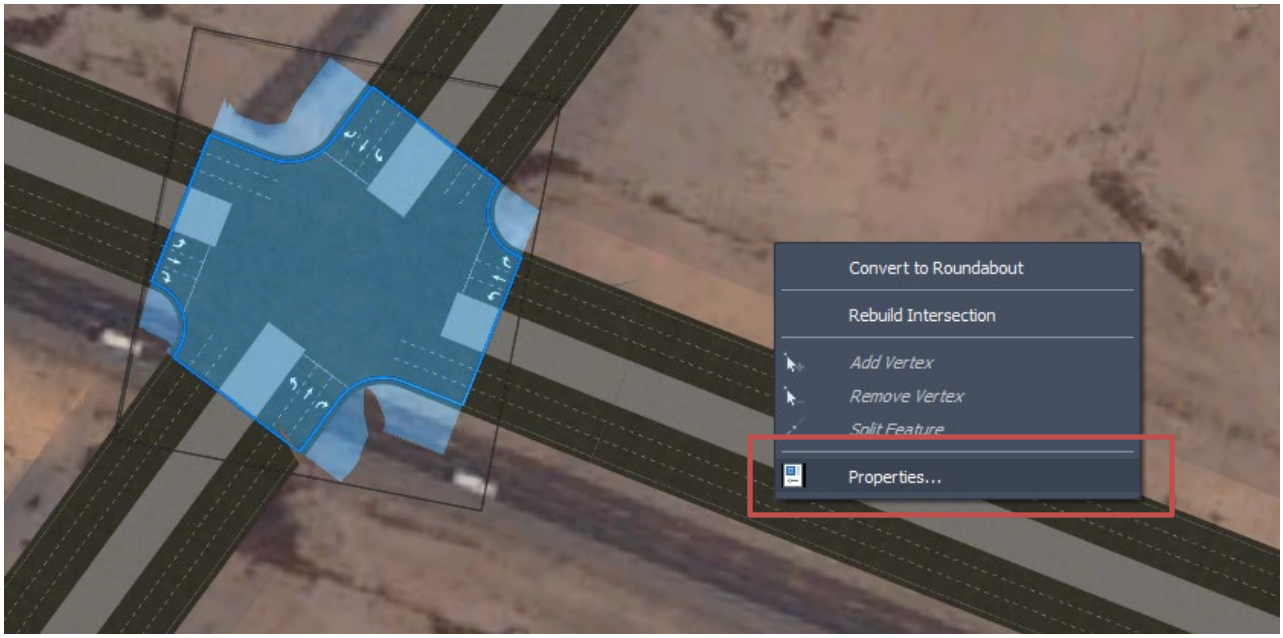


13. Exit Traffic Simulation by selecting either the X window on the top right corner of the window or by selecting from the Traffic Analyst main menu, Cloud, Close.

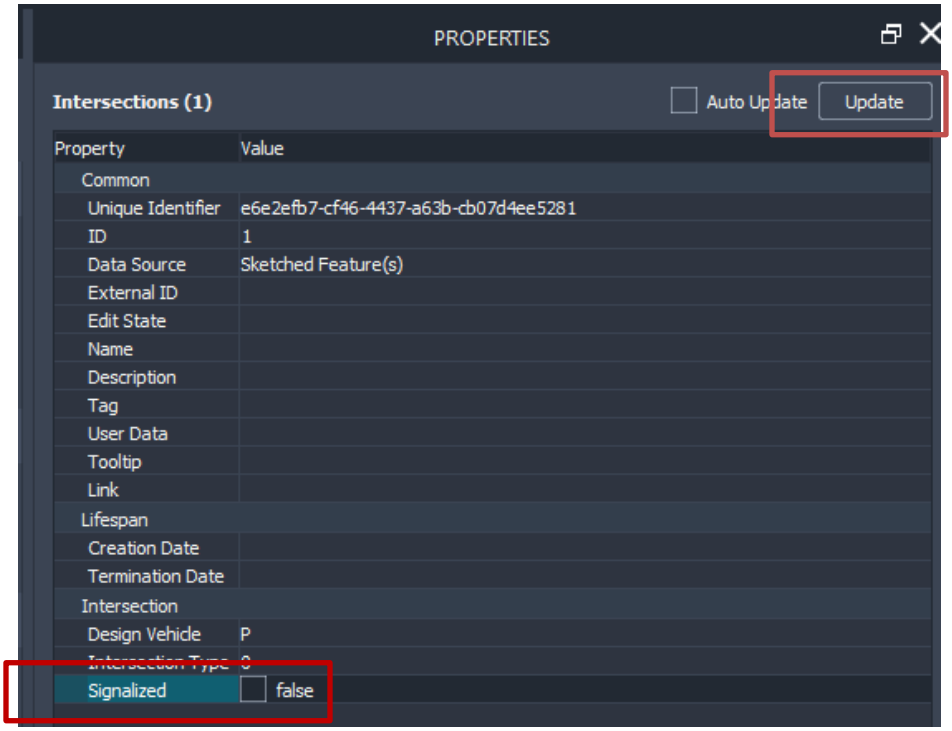
14. Go back to the InfraWorks Model and select Exit Traffic Simulation



15. Zoom in to the Intersection in the Traffic Study Area. Select it, right click and select Properties…

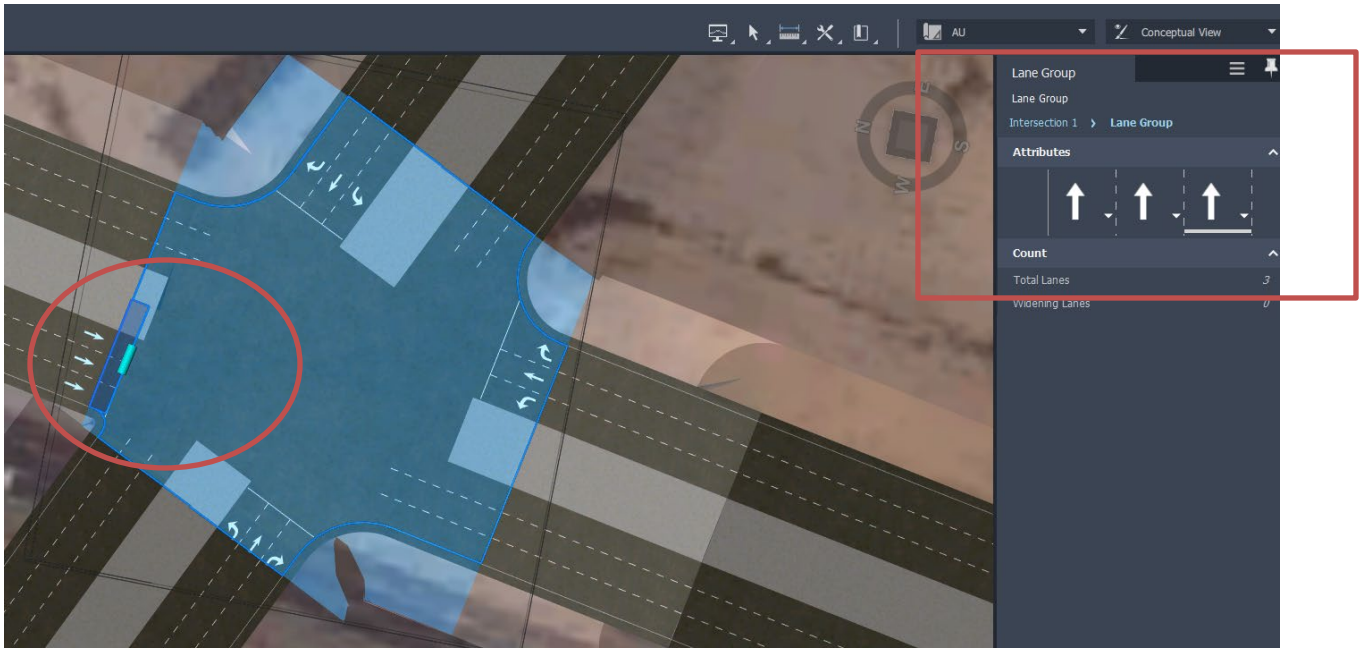


16. On the Properties dialog box, select the Signalized property, change the status to false and select Update

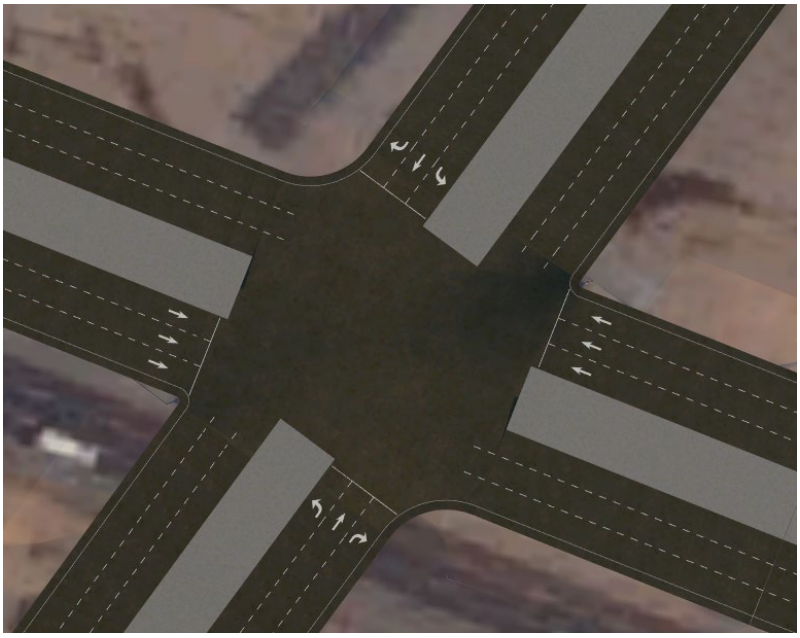


17. Close the Properties window. Select the Intersection once more and click on the turn signals. By doing so, turns are activated on the Lane Group window:

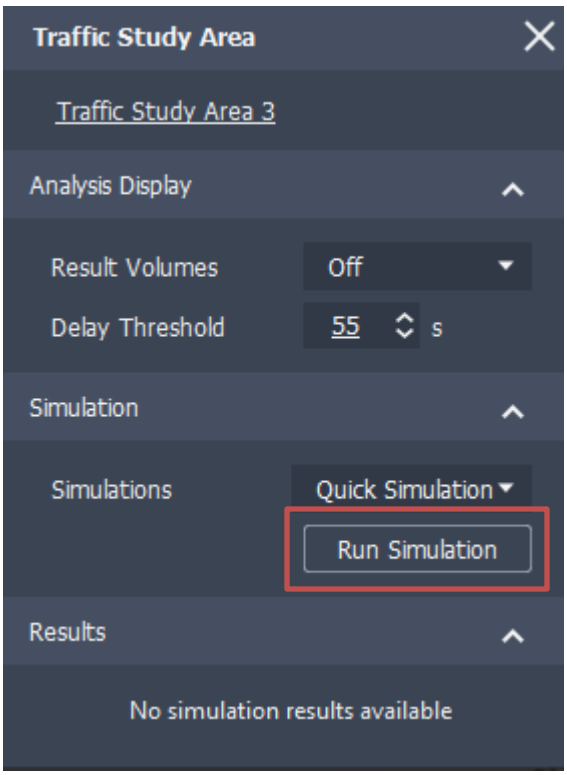
18. Since we are modeling an interstate, change turns to allow through movements:



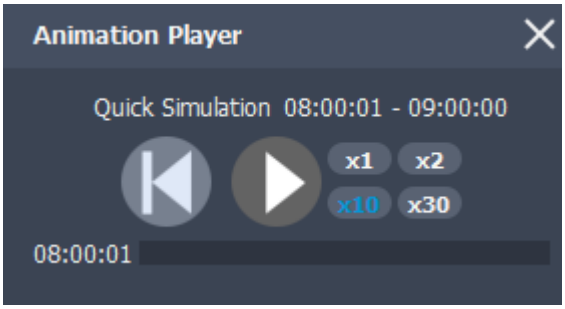
19. Repeat for the other side of the Interstate.



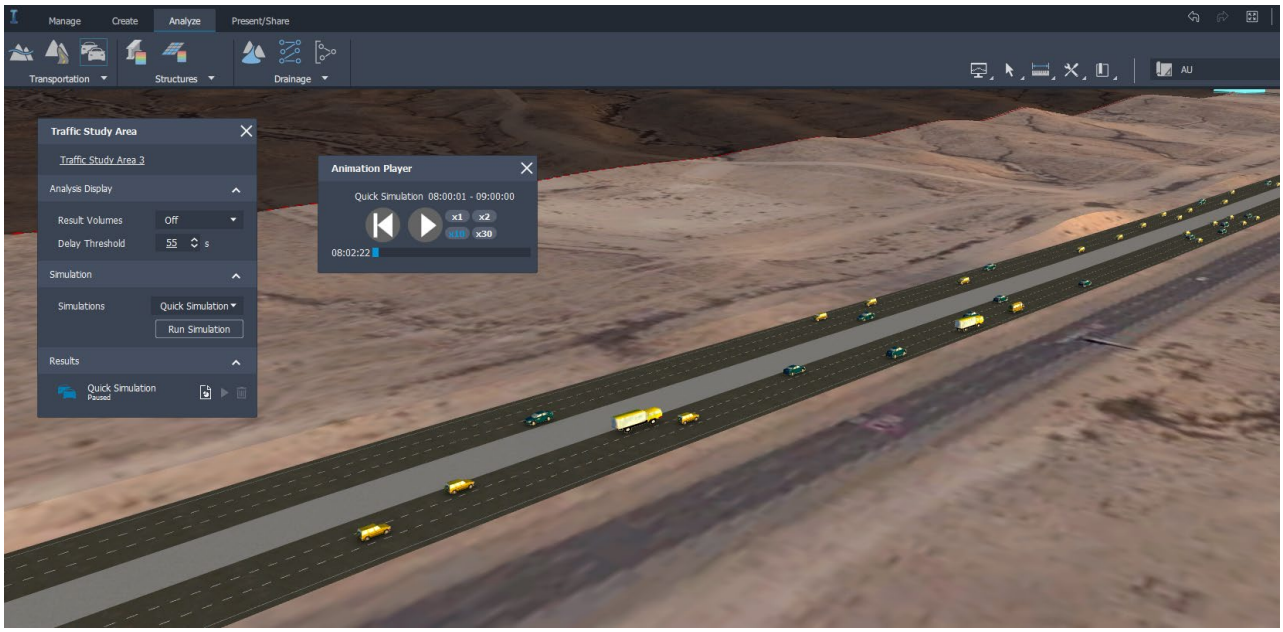
20. Under Analyze, select Transportation, Traffic Simulation. The recently created Traffic Area will highlight. On the Traffic Study Area Asset card, select Run Simulation:



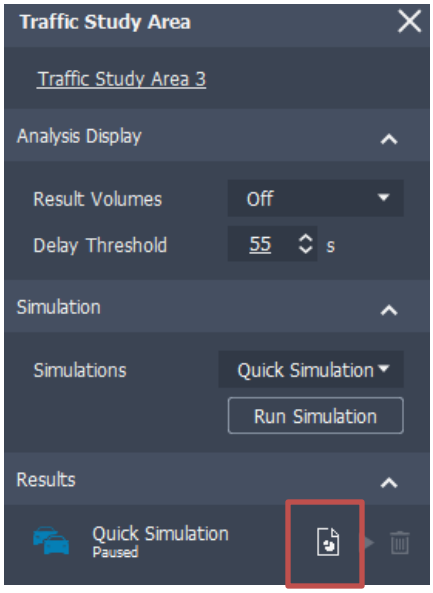
21. Once Simulation is run, select the Play symbol and select the x10 playing speed:



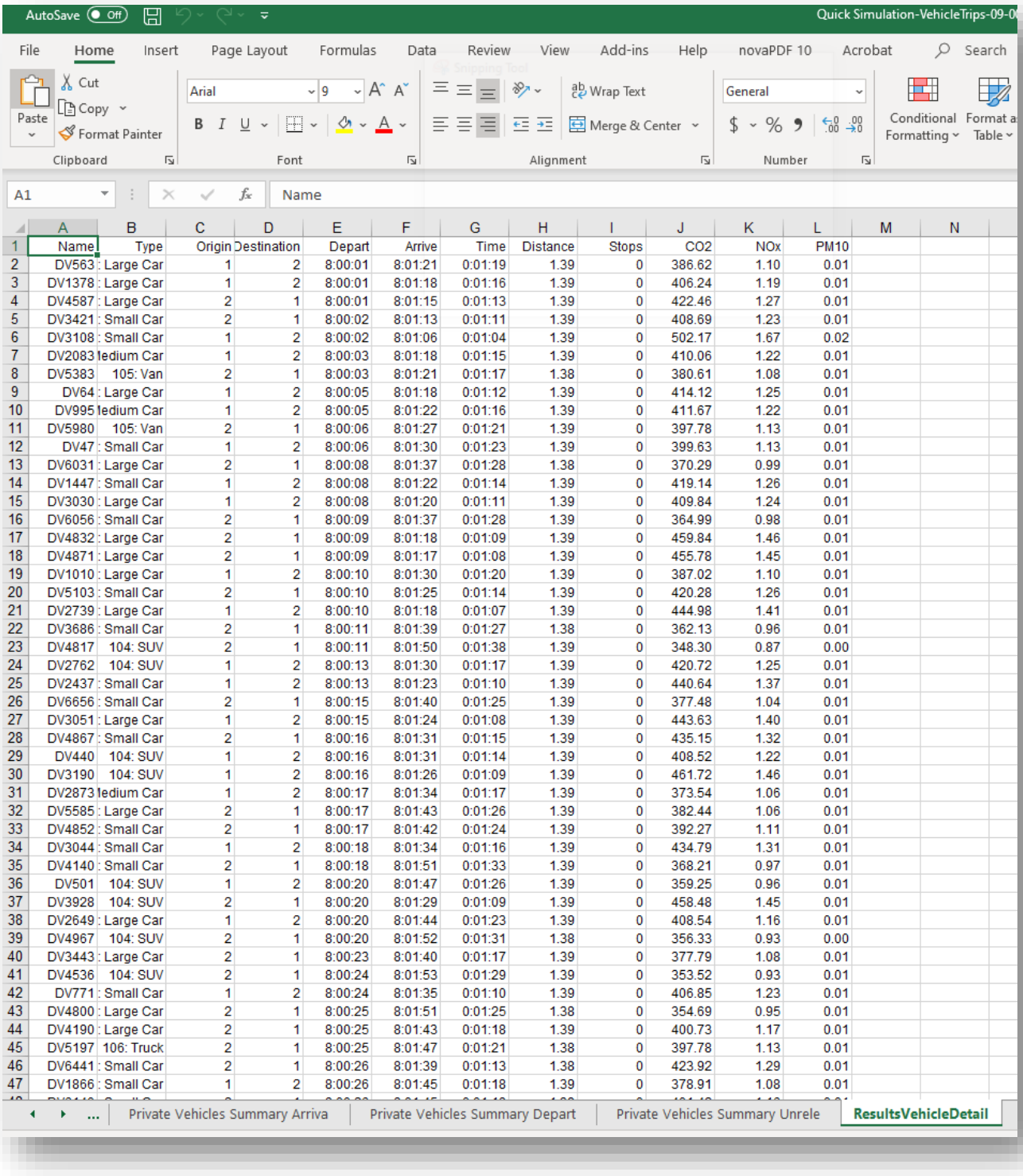
22. Traffic Simulation is run using real AADT values:



23. On the Traffic Study Area canvas, under Results, select the first icon (Fetch Report). Select a directory to store reports:



24. A variety of Excel Reports are created on the selected directory:



AutoSave Off — Quick Simulation-VehicleTrips-09-0

File Home Insert Page Layout Formulas Data Review View Add-ins Help novaPDF 10 Acrobat Search

Cut Copy Format Painter — Paste — Clipboard — Arial 9 — Font — Wrap Text Merge & Center — Alignment — General — Number — Conditional Formatting — Format as Table

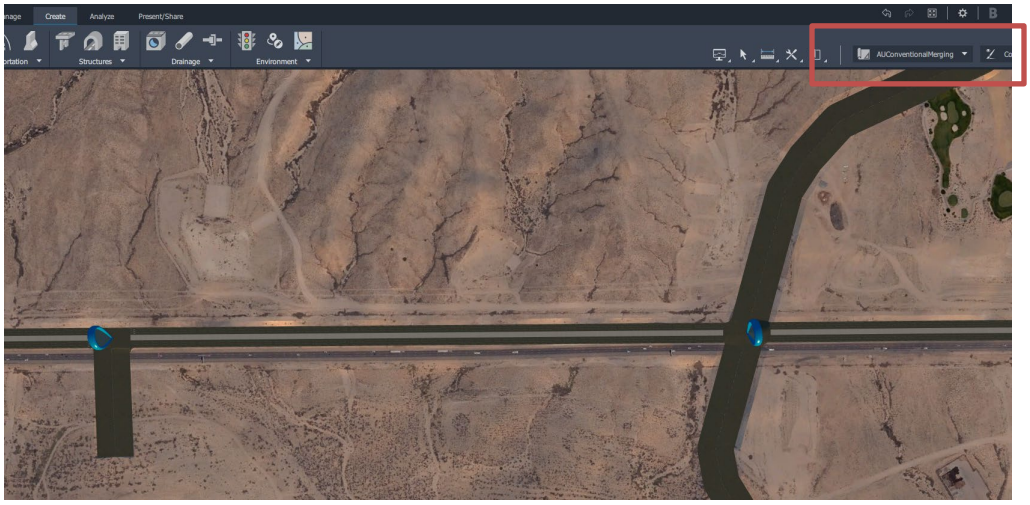
A1 Name

	A	B	C	D	E	F	G	H	I	J	K	L
1	Name	Type	Origin	Destination	Depart	Arrive	Time	Distance	Stops	CO2	NOx	PM10
2	DV563	Large Car	1	2	8:00:01	8:01:21	0:01:19	1.39	0	386.62	1.10	0.01
3	DV1378	Large Car	1	2	8:00:01	8:01:18	0:01:16	1.39	0	406.24	1.19	0.01
4	DV4587	Large Car	2	1	8:00:01	8:01:15	0:01:13	1.39	0	422.46	1.27	0.01
5	DV3421	Small Car	2	1	8:00:02	8:01:13	0:01:11	1.39	0	408.69	1.23	0.01
6	DV3108	Small Car	1	2	8:00:02	8:01:06	0:01:04	1.39	0	502.17	1.67	0.02
7	DV2083	edium Car	1	2	8:00:03	8:01:18	0:01:15	1.39	0	410.06	1.22	0.01
8	DV5383	105: Van	2	1	8:00:03	8:01:21	0:01:17	1.38	0	380.61	1.08	0.01
9	DV64	Large Car	1	2	8:00:05	8:01:18	0:01:12	1.39	0	414.12	1.25	0.01
10	DV995	edium Car	1	2	8:00:05	8:01:22	0:01:16	1.39	0	411.67	1.22	0.01
11	DV5980	105: Van	2	1	8:00:06	8:01:27	0:01:21	1.39	0	397.78	1.13	0.01
12	DV47	Small Car	1	2	8:00:06	8:01:30	0:01:23	1.39	0	399.63	1.13	0.01
13	DV6031	Large Car	2	1	8:00:08	8:01:37	0:01:28	1.38	0	370.29	0.99	0.01
14	DV1447	Small Car	1	2	8:00:08	8:01:22	0:01:14	1.39	0	419.14	1.26	0.01
15	DV3030	Large Car	1	2	8:00:08	8:01:20	0:01:11	1.39	0	409.84	1.24	0.01
16	DV6056	Small Car	2	1	8:00:09	8:01:37	0:01:28	1.39	0	364.99	0.98	0.01
17	DV4832	Large Car	2	1	8:00:09	8:01:18	0:01:09	1.39	0	459.84	1.46	0.01
18	DV4871	Large Car	2	1	8:00:09	8:01:17	0:01:08	1.39	0	455.78	1.45	0.01
19	DV1010	Large Car	1	2	8:00:10	8:01:30	0:01:20	1.39	0	387.02	1.10	0.01
20	DV5103	Small Car	2	1	8:00:10	8:01:25	0:01:14	1.39	0	420.28	1.26	0.01
21	DV2739	Large Car	1	2	8:00:10	8:01:18	0:01:07	1.39	0	444.98	1.41	0.01
22	DV3686	Small Car	2	1	8:00:11	8:01:39	0:01:27	1.38	0	362.13	0.96	0.01
23	DV4817	104: SUV	2	1	8:00:11	8:01:50	0:01:38	1.39	0	348.30	0.87	0.00
24	DV2762	104: SUV	1	2	8:00:13	8:01:30	0:01:17	1.39	0	420.72	1.25	0.01
25	DV2437	Small Car	1	2	8:00:13	8:01:23	0:01:10	1.39	0	440.64	1.37	0.01
26	DV6656	Small Car	2	1	8:00:15	8:01:40	0:01:25	1.39	0	377.48	1.04	0.01
27	DV3051	Large Car	1	2	8:00:15	8:01:24	0:01:08	1.39	0	443.63	1.40	0.01
28	DV4867	Small Car	2	1	8:00:16	8:01:31	0:01:15	1.39	0	435.15	1.32	0.01
29	DV440	104: SUV	1	2	8:00:16	8:01:31	0:01:14	1.39	0	408.52	1.22	0.01
30	DV3190	104: SUV	1	2	8:00:16	8:01:26	0:01:09	1.39	0	461.72	1.46	0.01
31	DV2873	edium Car	1	2	8:00:17	8:01:34	0:01:17	1.39	0	373.54	1.06	0.01
32	DV5585	Large Car	2	1	8:00:17	8:01:43	0:01:26	1.39	0	382.44	1.06	0.01
33	DV4852	Small Car	2	1	8:00:17	8:01:42	0:01:24	1.39	0	392.27	1.11	0.01
34	DV3044	Small Car	1	2	8:00:18	8:01:34	0:01:16	1.39	0	434.79	1.31	0.01
35	DV4140	Small Car	2	1	8:00:18	8:01:51	0:01:33	1.39	0	368.21	0.97	0.01
36	DV501	104: SUV	1	2	8:00:20	8:01:47	0:01:26	1.39	0	359.25	0.96	0.01
37	DV3928	104: SUV	2	1	8:00:20	8:01:29	0:01:09	1.39	0	458.48	1.45	0.01
38	DV2649	Large Car	1	2	8:00:20	8:01:44	0:01:23	1.39	0	408.54	1.16	0.01
39	DV4967	104: SUV	2	1	8:00:20	8:01:52	0:01:31	1.38	0	356.33	0.93	0.00
40	DV3443	Large Car	2	1	8:00:23	8:01:40	0:01:17	1.39	0	377.79	1.08	0.01
41	DV4536	104: SUV	2	1	8:00:24	8:01:53	0:01:29	1.39	0	353.52	0.93	0.01
42	DV771	Small Car	1	2	8:00:24	8:01:35	0:01:10	1.39	0	406.85	1.23	0.01
43	DV4800	Large Car	2	1	8:00:25	8:01:51	0:01:25	1.38	0	354.69	0.95	0.01
44	DV4190	Large Car	2	1	8:00:25	8:01:43	0:01:18	1.39	0	400.73	1.17	0.01
45	DV5197	106: Truck	2	1	8:00:25	8:01:47	0:01:21	1.38	0	397.78	1.13	0.01
46	DV6441	Small Car	2	1	8:00:26	8:01:39	0:01:13	1.38	0	423.92	1.29	0.01
47	DV1866	Small Car	1	2	8:00:26	8:01:45	0:01:18	1.39	0	378.91	1.08	0.01

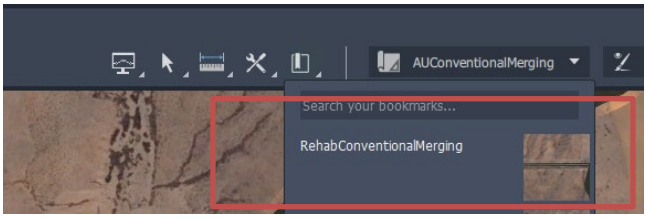
Private Vehicles Summary Arriva | Private Vehicles Summary Depart | Private Vehicles Summary Unrele | ResultsVehicleDetail

Traffic Simulation – Conventional Merging

1. Switch to the AUConventionalMerging proposal:



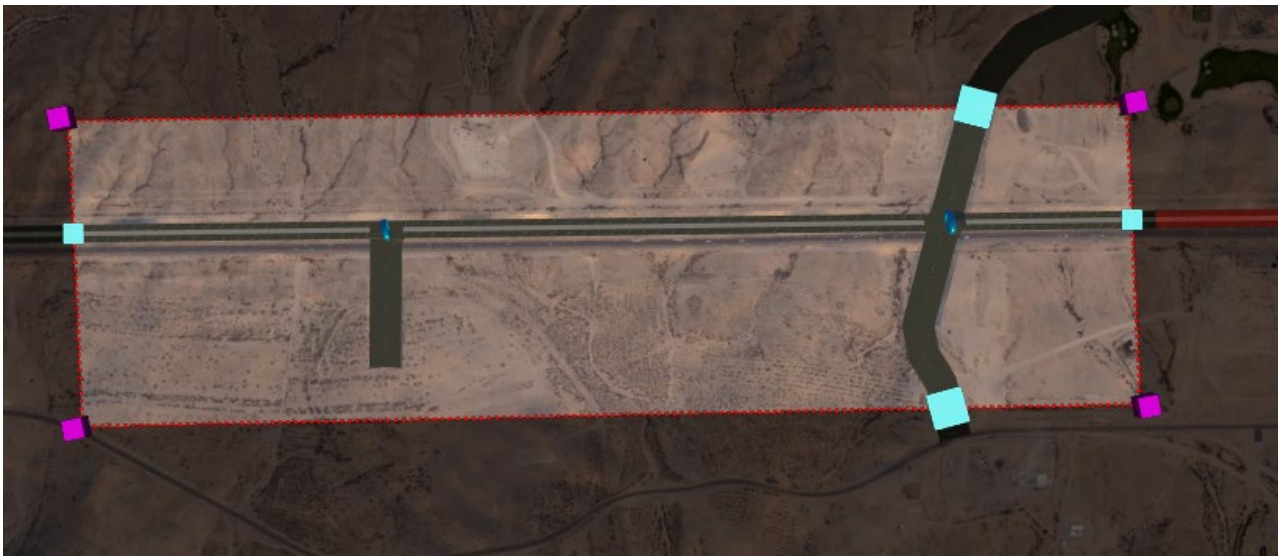
2. Select the RehabConventionalMerging Bookmark



3. Notice there is another auxiliary intersection before the merging point defining the start of the Advance Warning Area.

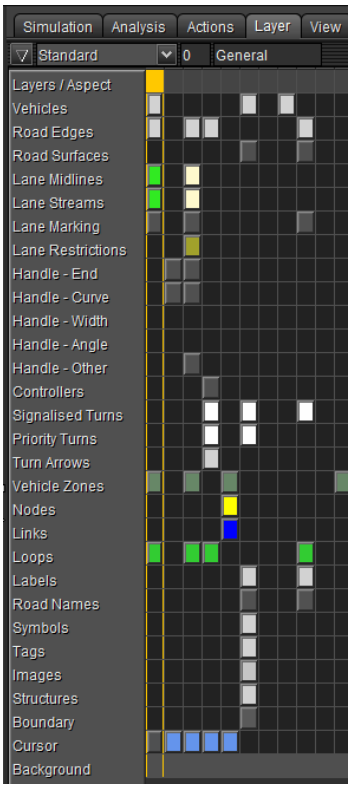
4. From the InfraWorks Analyze tab, select Traffic Simulation.

5. Define a New Traffic Study Area encompassing lanes prior to advance warning closure signs, merging point and closing lane area:

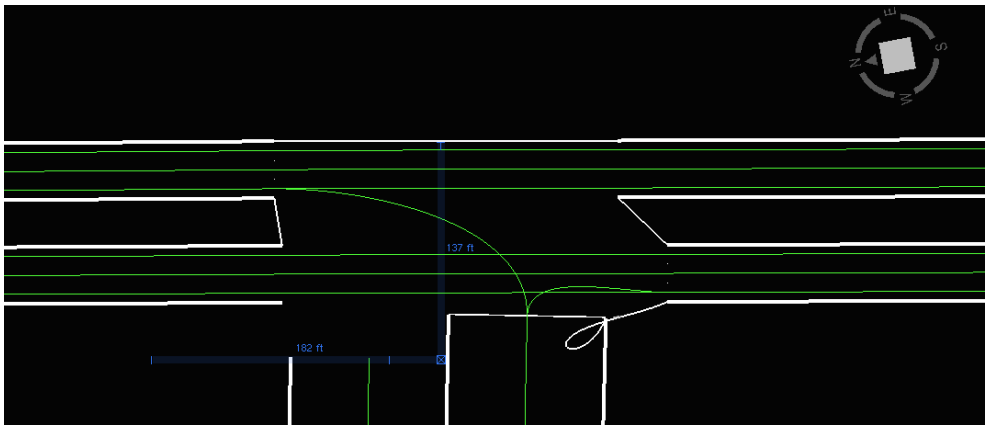


6. Right Click and select Traffic Analyst Panel. Select OK if prompted.

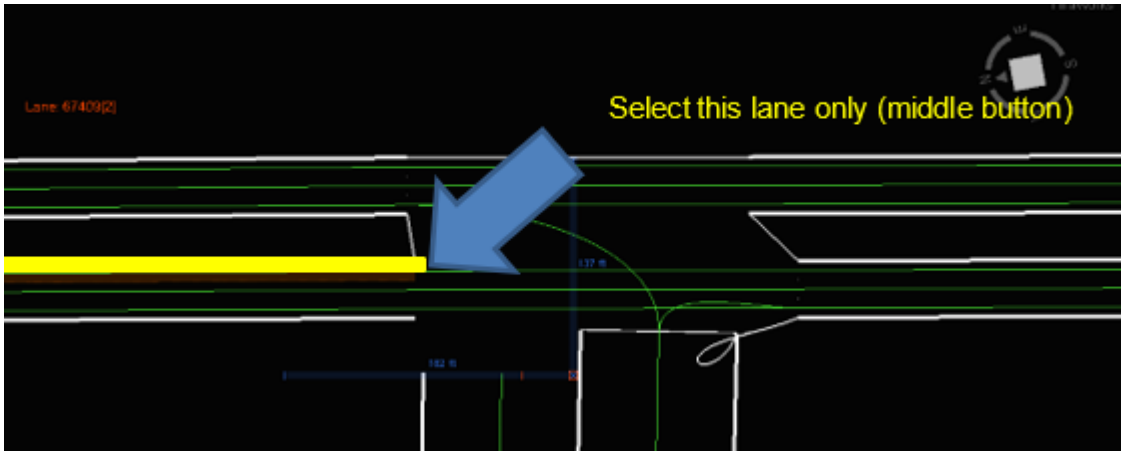
7. As in the previous exercise, turn off image, road surface layers and turn on Lane Midline and Lane Streams layers:



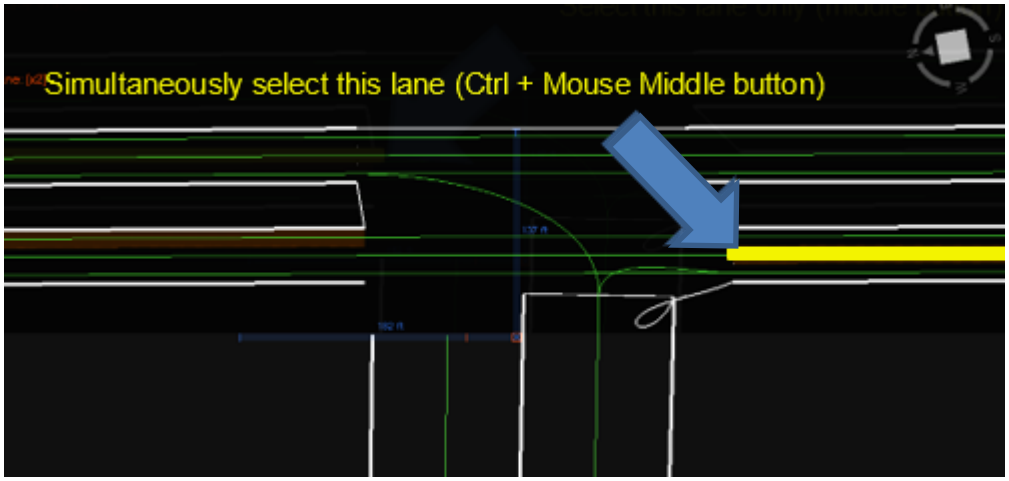
8. Zoom in to the Advance Warning Intersection (Left Intersection):



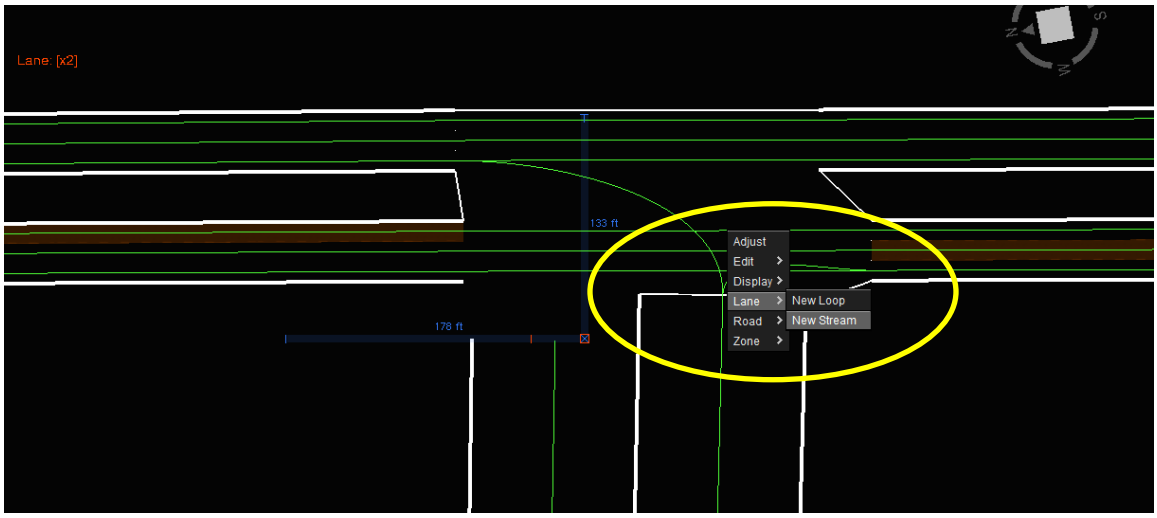
9. Using the mouse middle button, select only the lane next to the median on the left side of the intersections:



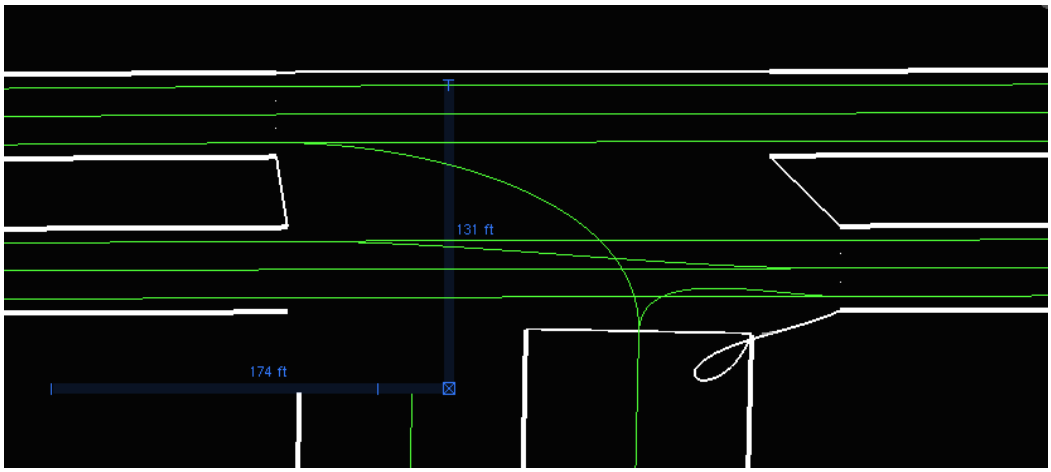
10. By pressing the Ctrl key on the keyboard, now select using the mouse middle button, the middle lane on the right side of the intersection



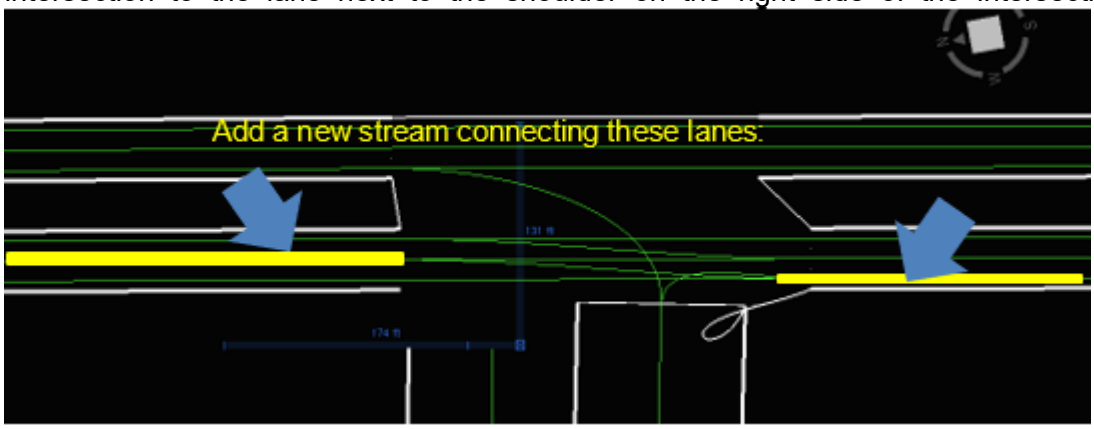
11. With both lanes simultaneously selected, right click in the window and select Lane > New Stream:



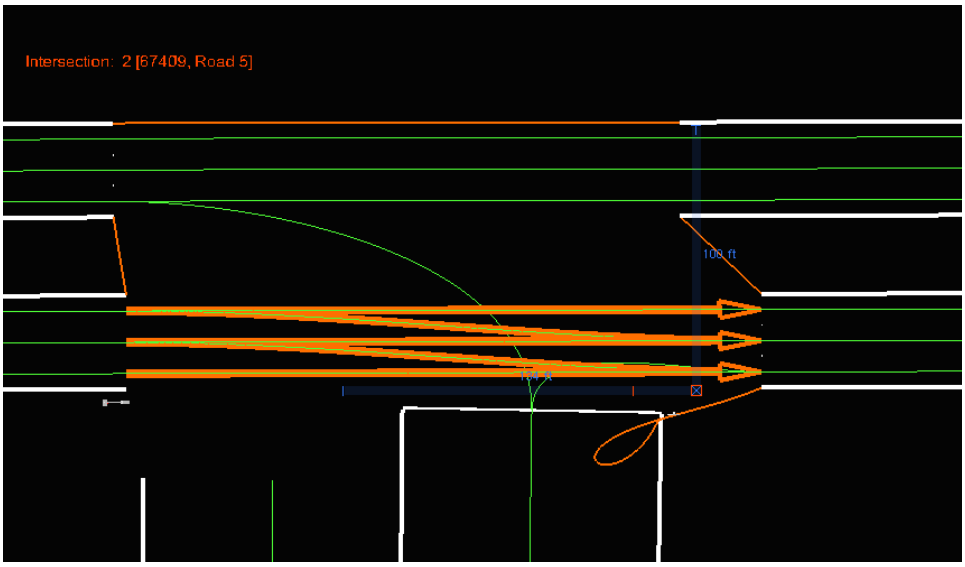
A new stream (turn is added between these lanes):



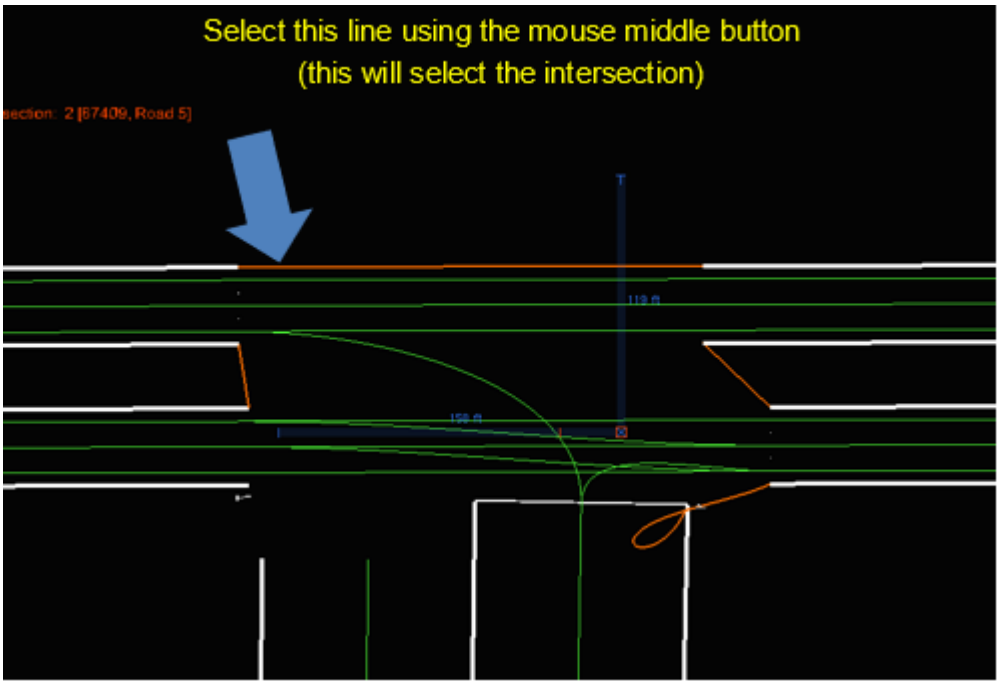
12. Repeat the process to add a new stream from the middle lane on the left part of the intersection to the lane next to the shoulder on the right side of the intersection:



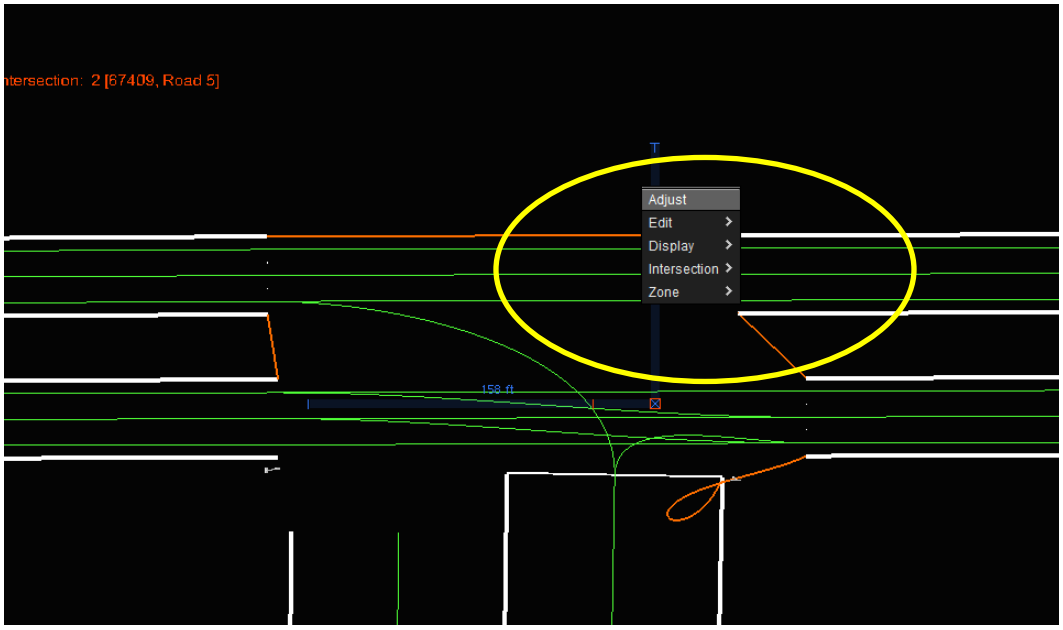
By doing so, turning movements at this intersection will be connected as follows:



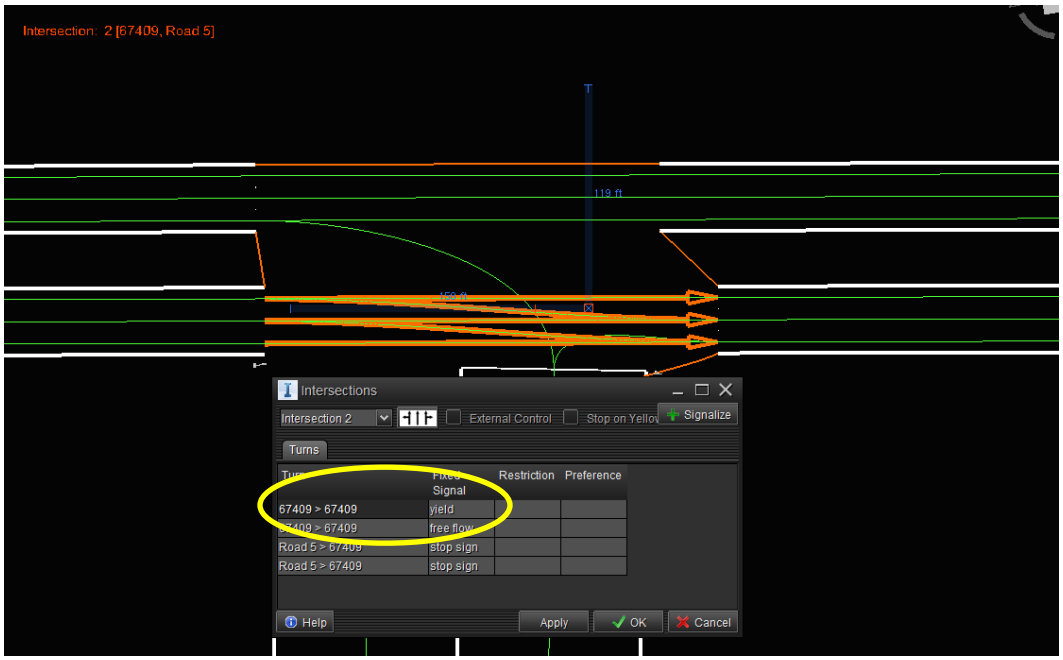
13. Select the top line of the intersection using the mouse middle button:



14. Right click in the window and select Adjust (by doing so, the intersection is edited):

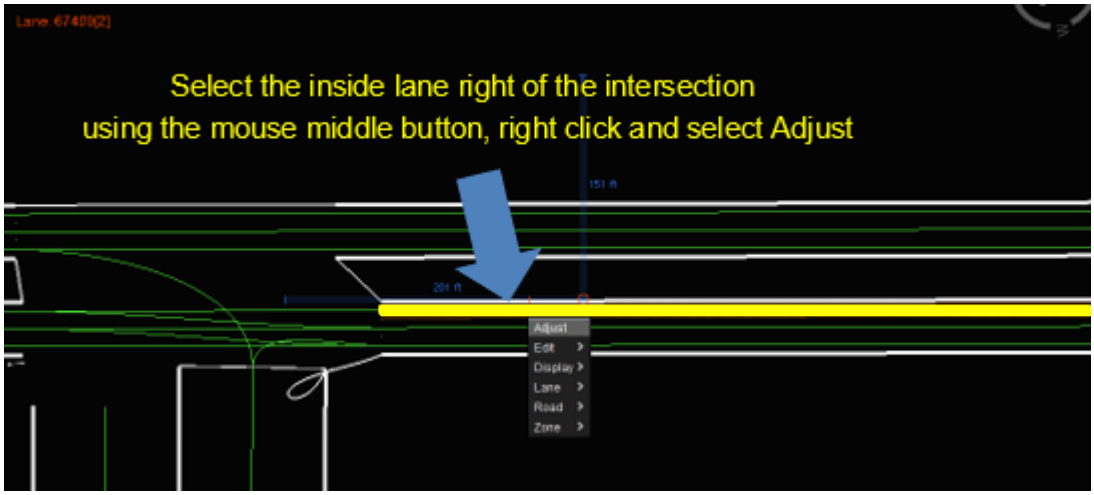


15. All turning movements at the intersection are listed. Select the turning movement from left to right and under Fixed Signal, change it to **Yield:**

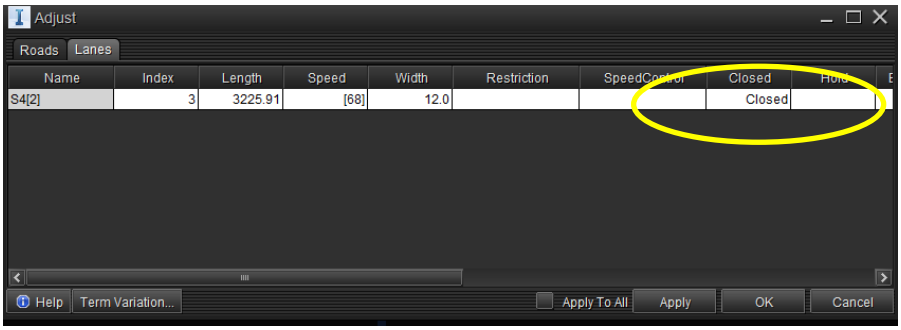


Select Apply and OK.

16. Using the mouse middle button, select the lane next to the median on the right side of the intersection, right click anywhere in the window and select Adjust (this will edit the lane's properties):

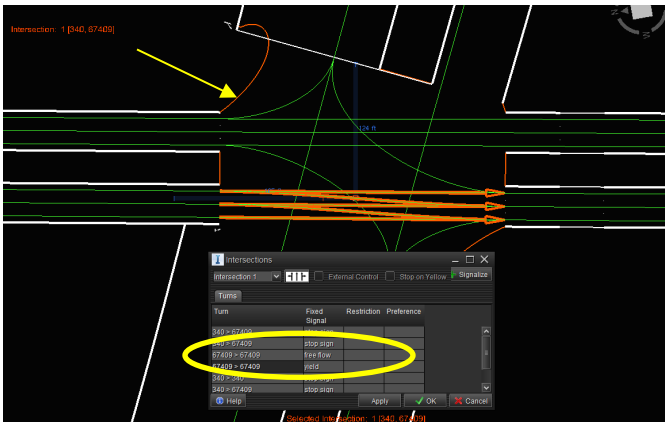


17. Select the Lanes tab, and under the Closed column, select **Closed**:

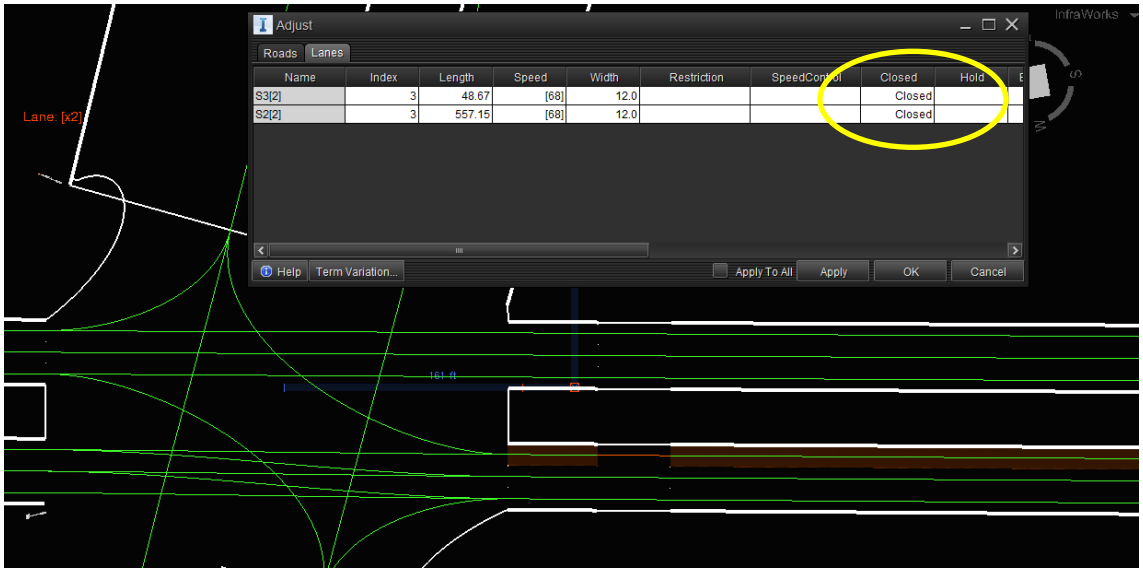


Select Apply and Close.

18. Repeat all steps done to the previous intersection (add streams, edit intersection by selecting a quadrant line and define a yield movement to the turning group):

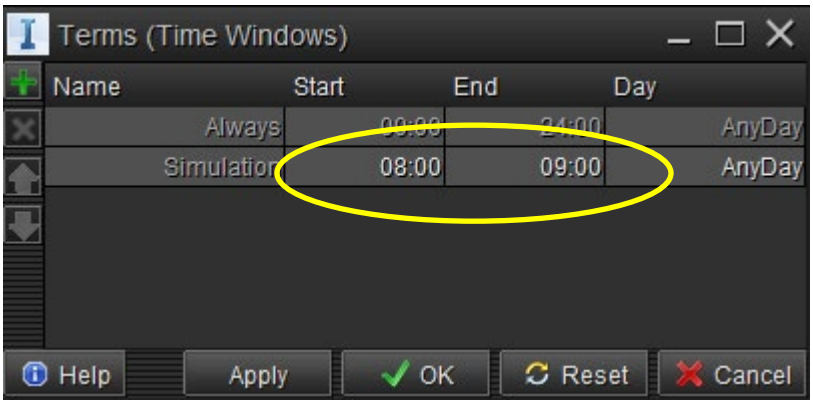


19. Select the inside lanes (next to the median) to the right of the intersection, right click and select Adjust. Select the Lanes tab, and under Closed, toggle the value to **Closed:**

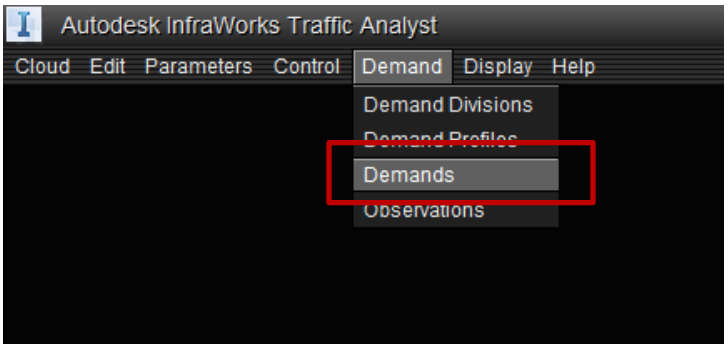


NOTE: LANES NEXT TO THE RIGHT OF THE FINAL MERGING POINT ARE CLOSED. TWO LANES WERE SELECTED. ALWAYS PAY CLOSE ATTENTION TO THE ENTIRE HIGHLIGHTED LANE. IF IT DOES NOT ENCOMPASS THE TOTAL LENGTH, SELECT ALL LANES TO EDIT THEM AND CLOSE THEIR BEHAVIOR.

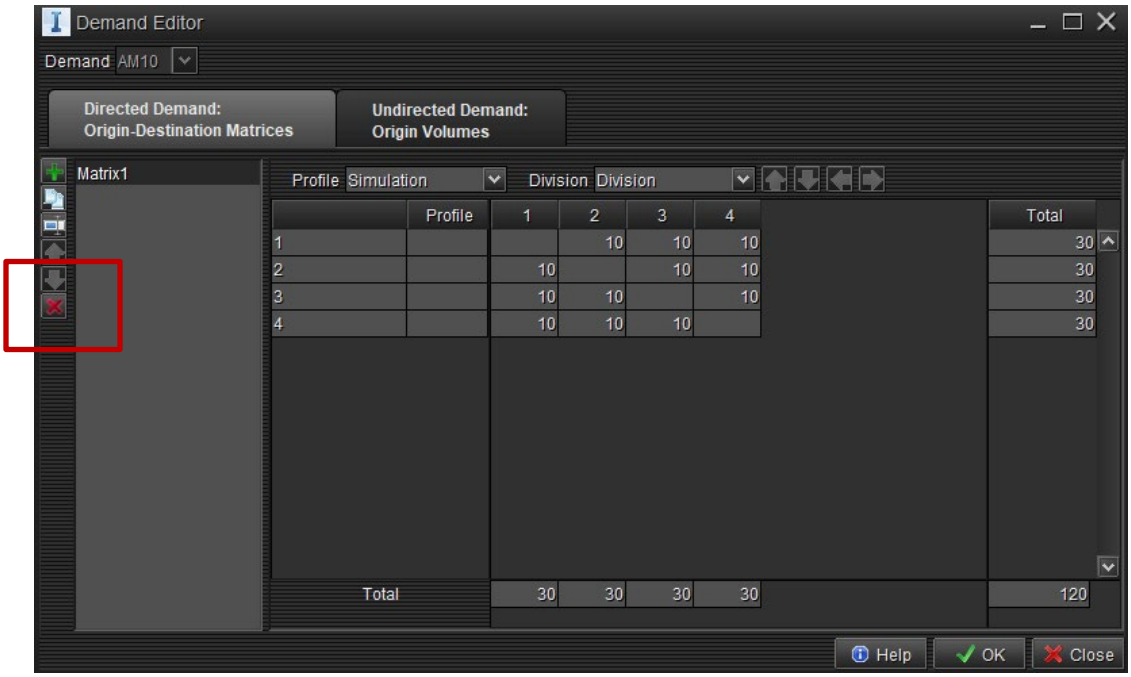
20. From the Autodesk InfraWorks Traffic Analyst menu, select Parameters > Terms. Under Simulation, change the Simulation term from 08:00 to 09:00. Select Apply and OK.



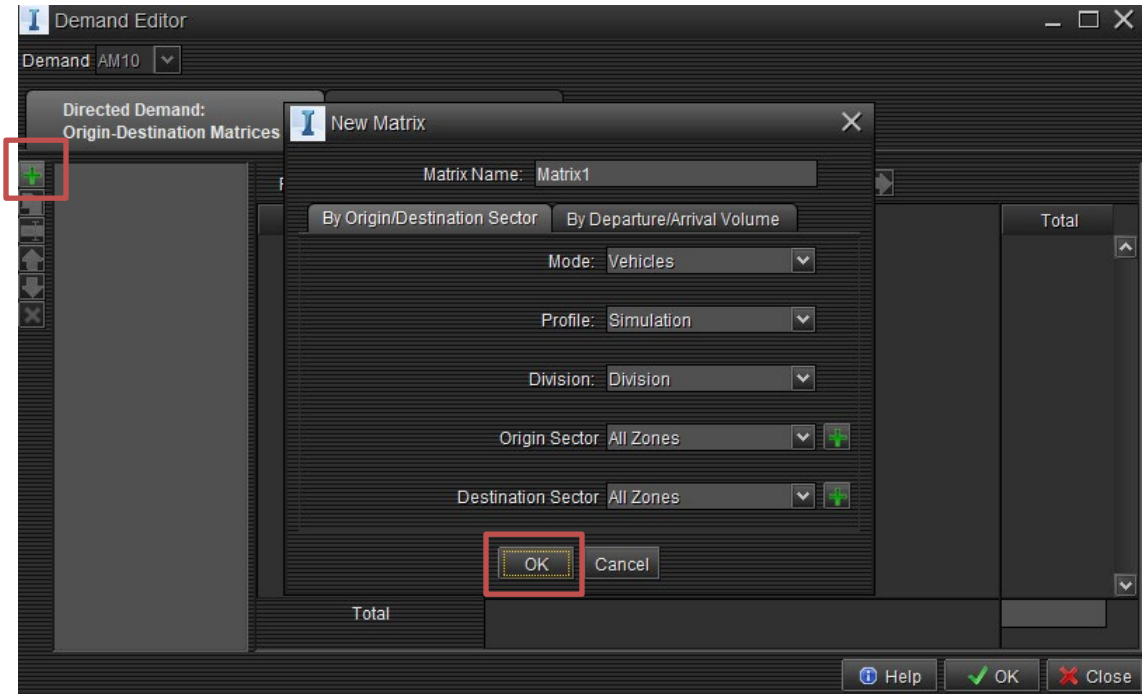
21. From the Autodesk InfraWorks Traffic Analyst menu, select the Demand tab, select Demands:



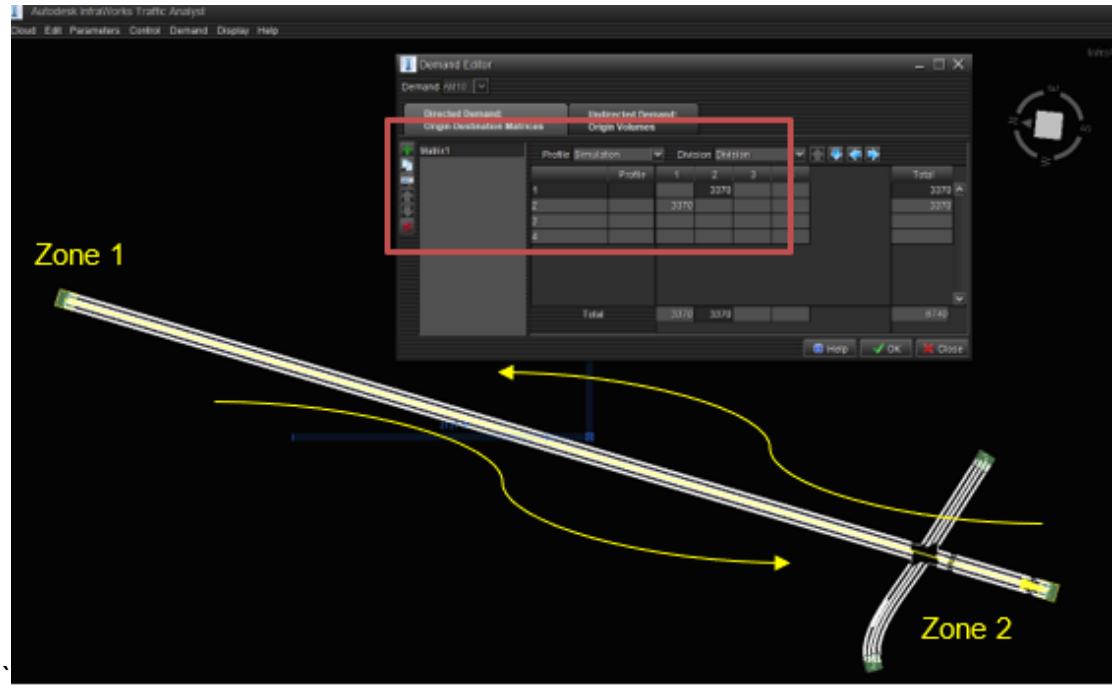
22. The Demand Editor dialog box appears. Select the X icon to delete the default Matrix, Matrix 1:



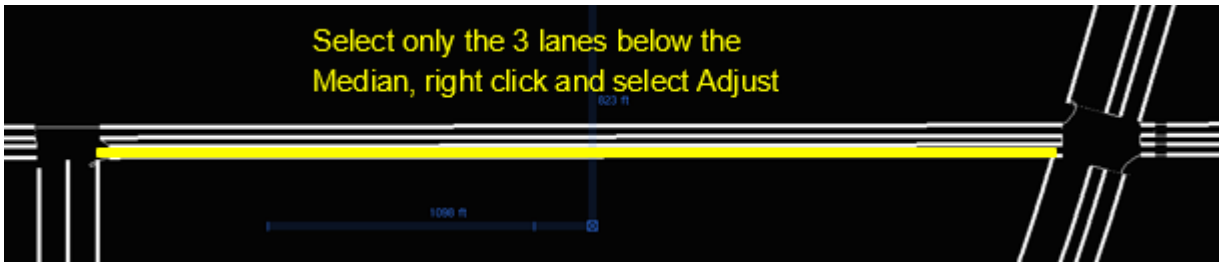
23. Select the + Sign icon on the left side. Select OK on the bottom of the dialog box:



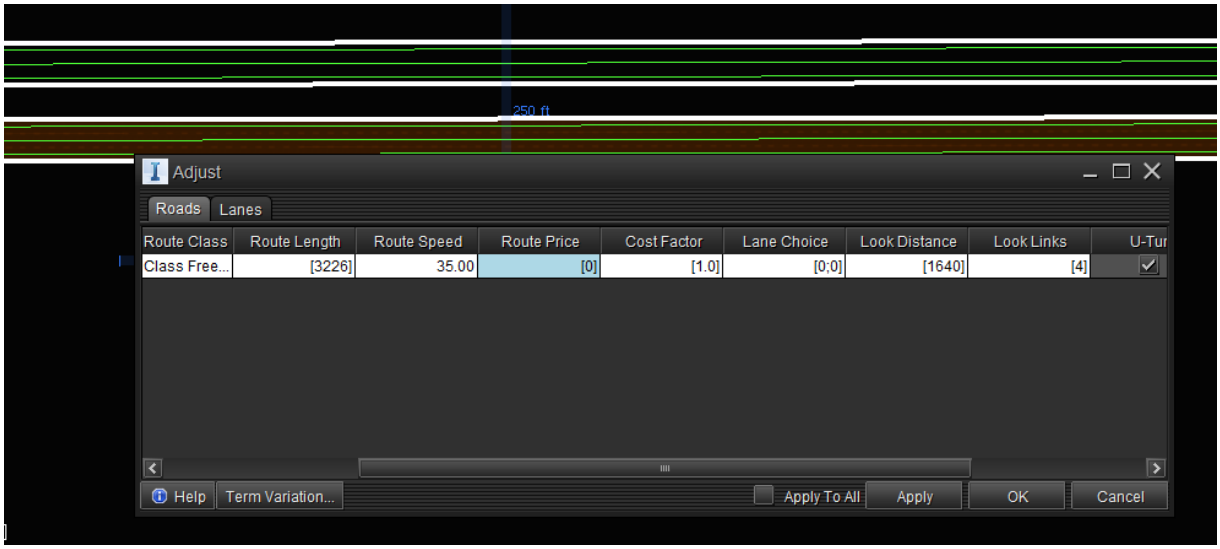
24. Since we will only be simulating traffic on the Interstate, type in 3370 on the Zone 1 to Zone 2 box and 3370 on the Zone 2 to Zone 1 box. Select OK:



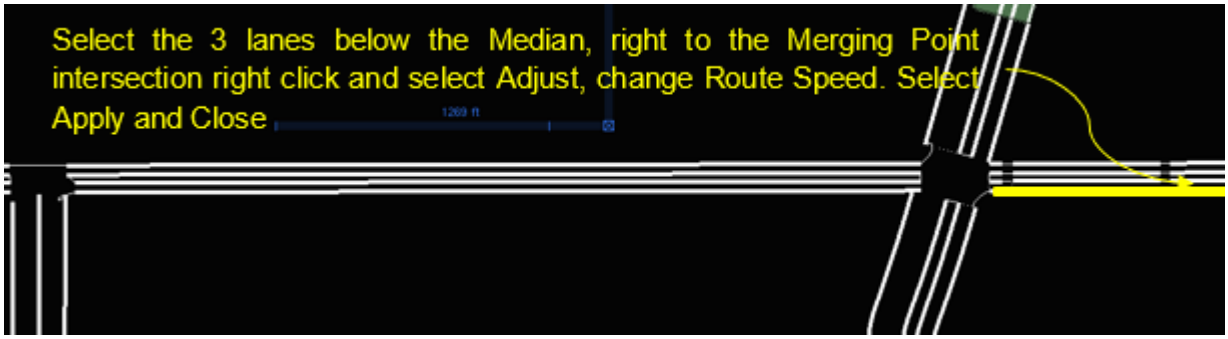
25. By pressing and holding the middle mouse button, select the three lanes below the median and select Adjust:



26. Select the Roads tab and under Route Speed, change it to 35 mph. Select Apply and Close:

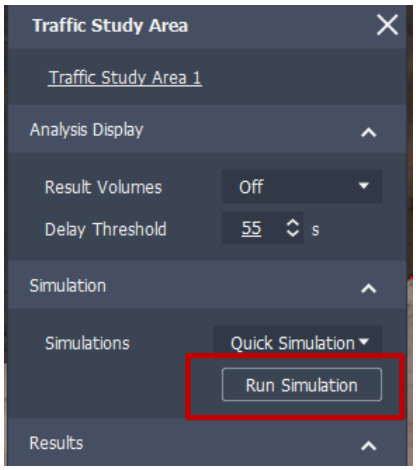


27. Repeat steps 25 and 26 to lanes right of the merging point intersection to change speed to 35 mph as vehicles are slowed down at work zones. Select Apply and Close:

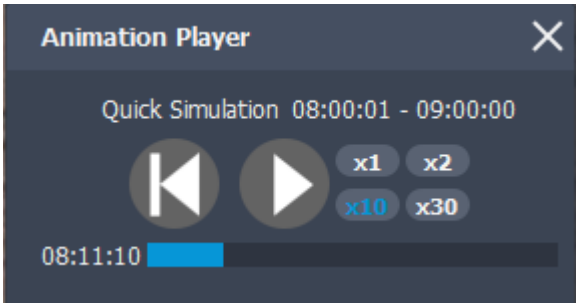


NOTE: SELECT ALL LANES ON ALL ROADS RIGHT OF THE INTERSECTION AND CHANGE SPEED.

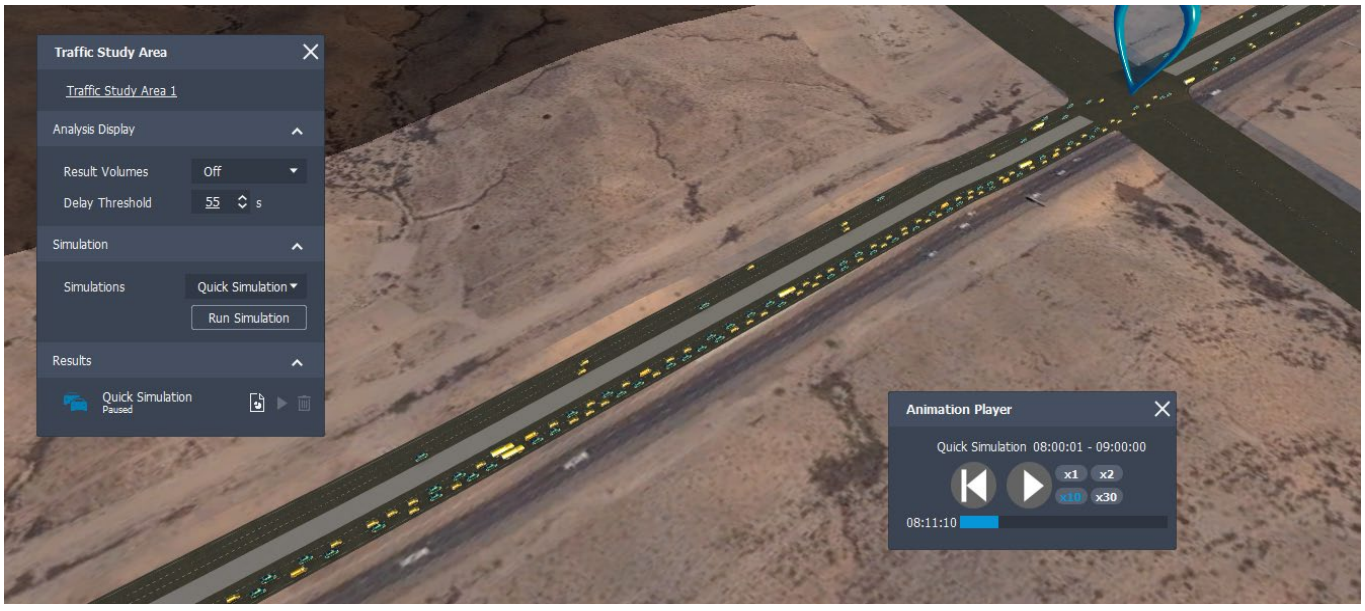
28. Close Autodesk InfraWorks Traffic Analyst. Go back to the InfraWorks Model and on the Traffic Study Area canvas, select Run Simulation:



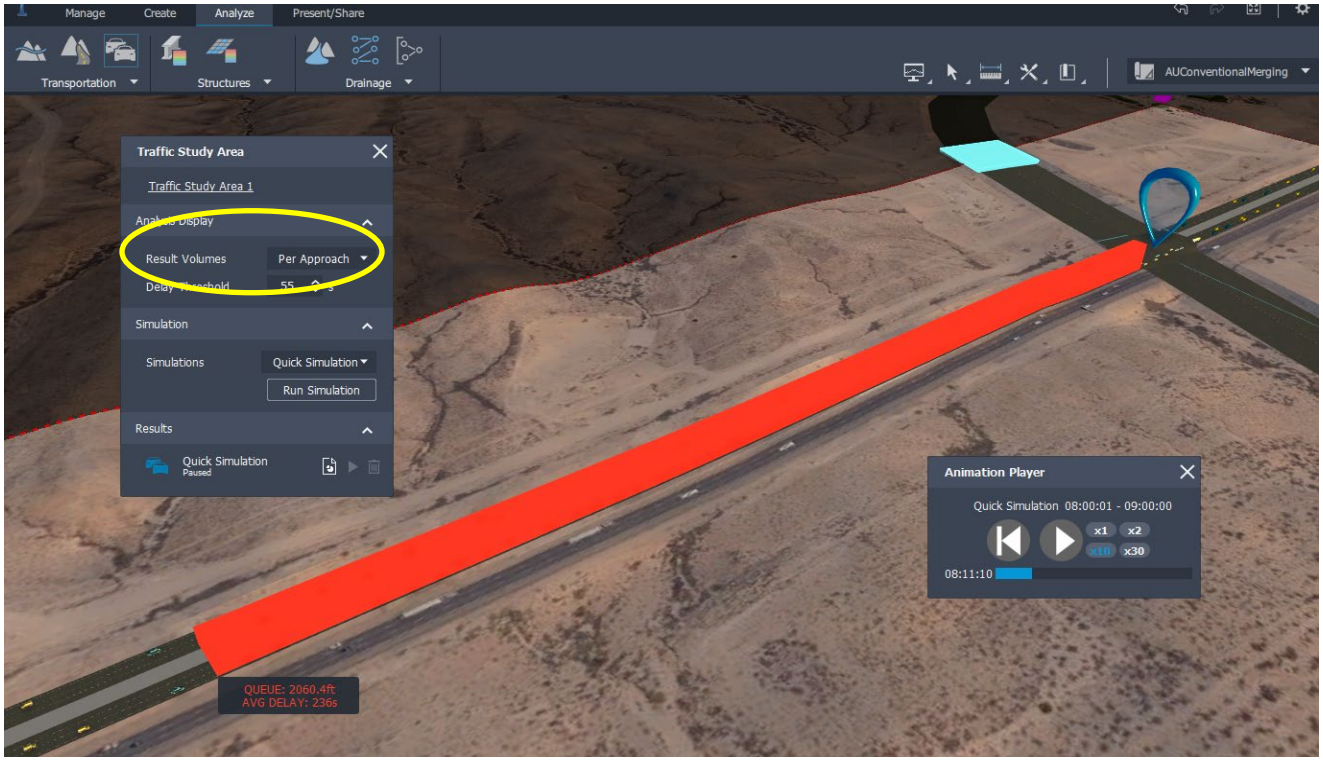
29. On the Animation Player window, select the x10 speed and select Play:



30. MicroSimulation is run. Vehicles merge to open lanes well before the final merging point under conventional merging behavior:



31. On the Traffic Analyst canvas, select Results Volume Per Approach. A Level of Service Polygon is now displayed at each intersection:

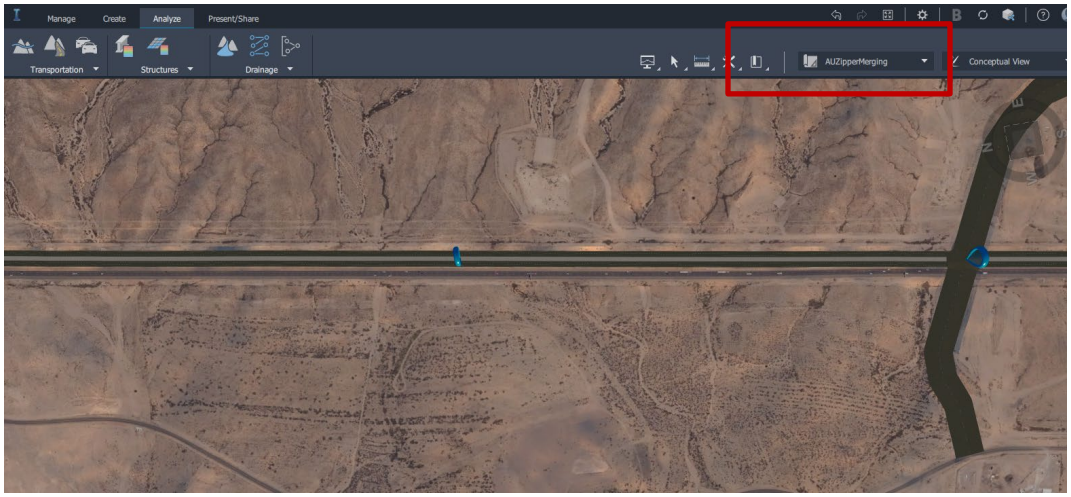


AVERAGE DELAY AND QUEUE LENGTHS ARE DISPLAYED WHEN HOVERING OVER THE POLYGON

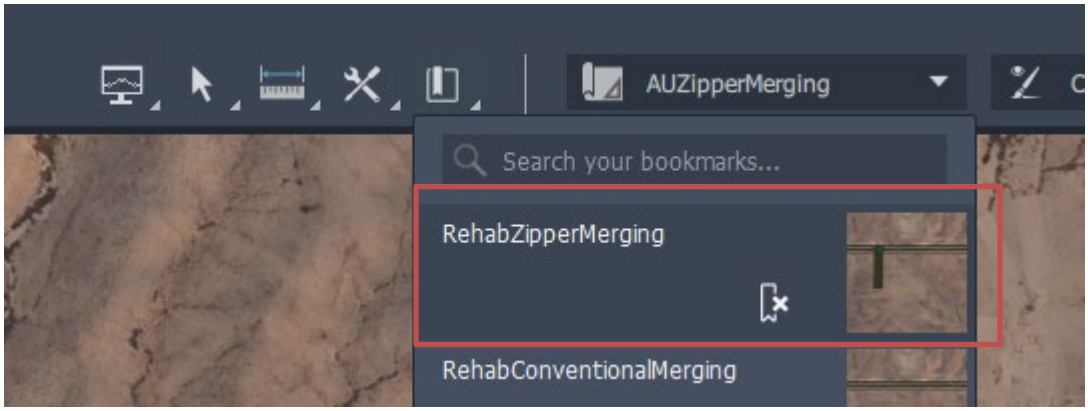
NOTE: LEVELS OF SERVICE A, B, C, D ARE DISPLAYED IN CYAN, LEVELS OF SERVICE E, F, IN RED.

Traffic Simulation – Zipper Merging

1. Switch to the AUZipperMerging proposal:



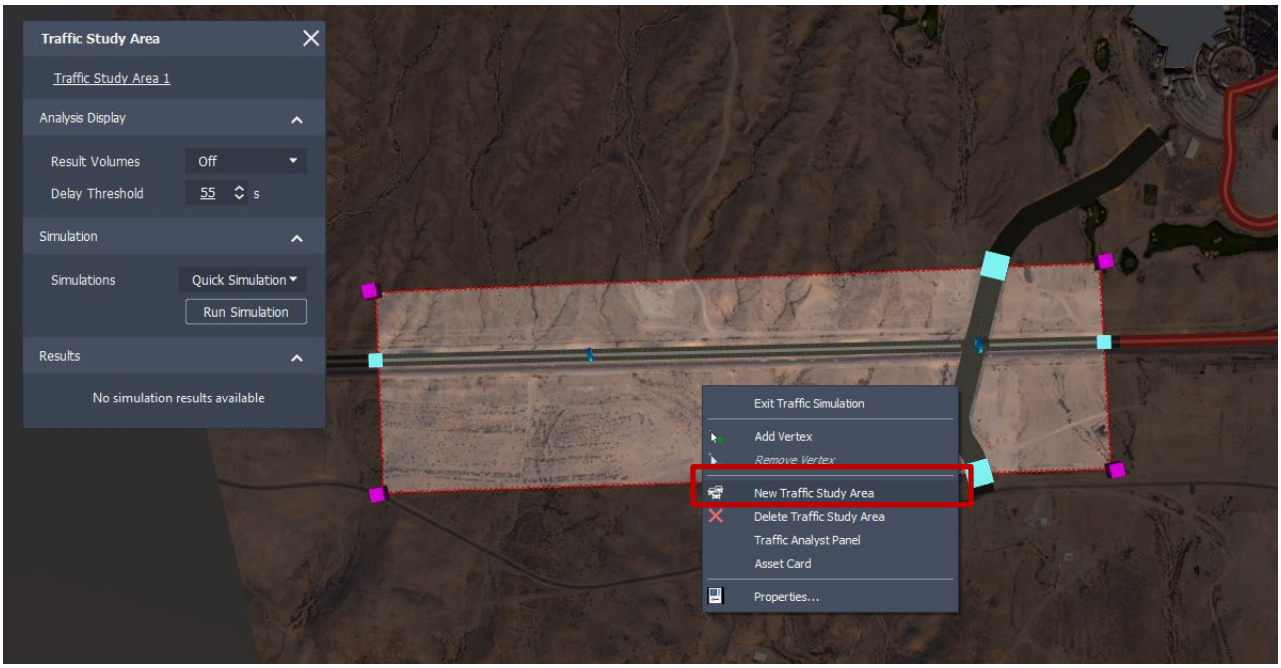
2. Select the RehabConventionalMerging Bookmark



3. Notice there is now only one intersection at the merging point:

4. From the InfraWorks Analyze tab, select Traffic Simulation.

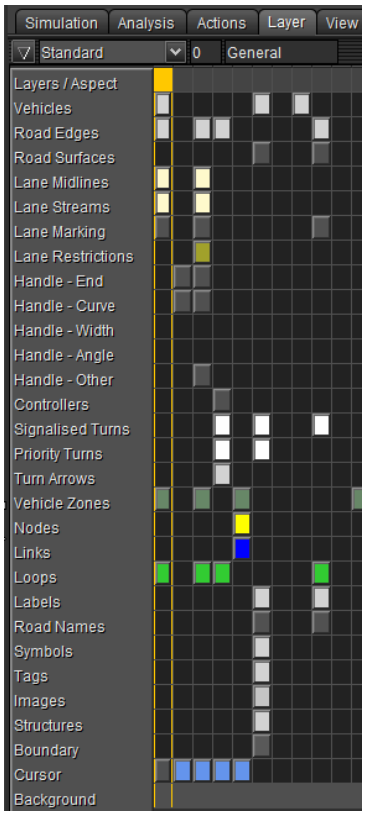
5. The previous Conventional Traffic Study Area is highlighted. Right click in the window and select New Traffic Study Area:



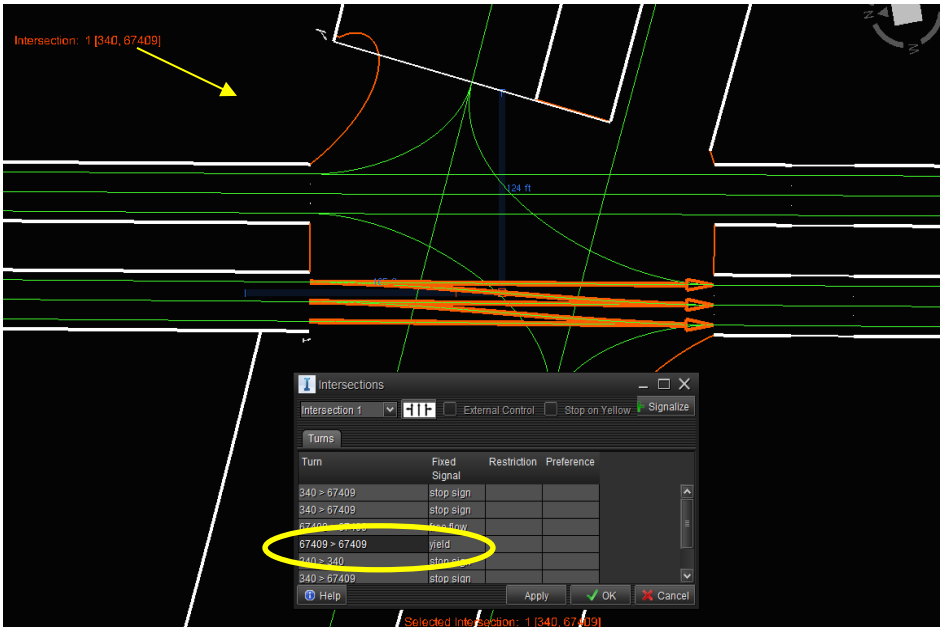
6. Define a New Traffic Study Area encompassing approximately the same area as the one created in Conventional Merging (does not have to be exact):

7. Right Click and select Traffic Analyst Panel. Select OK if prompted.

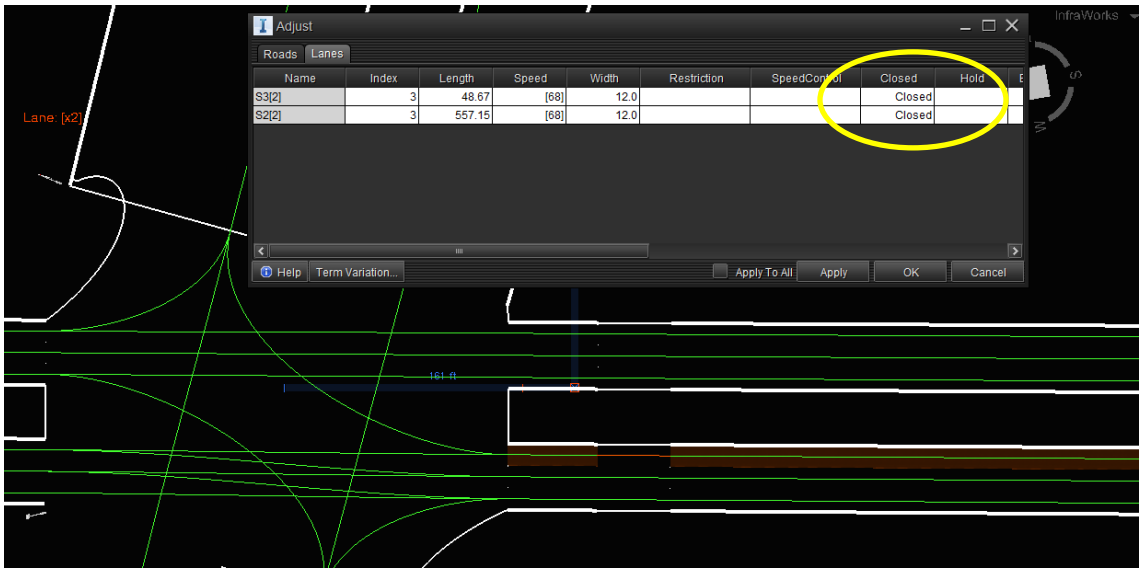
8. As in Conventional Merging, turn off image, road surface layers and turn on Lane Midline and Lane Streams layers:



9. Repeat all steps done in Conventional Merging (add streams, edit intersection by selecting a quadrant line, right click, Adjust and define a yield movement to the turning group):

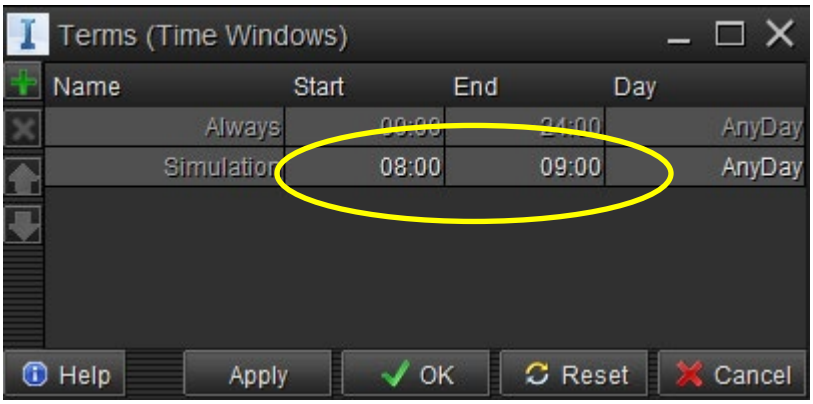


10. Select the inside lanes (next to the median) to the right of the intersection, right click and select Adjust. Select the Lanes tab, and under Closed, toggle the value to **Closed:**

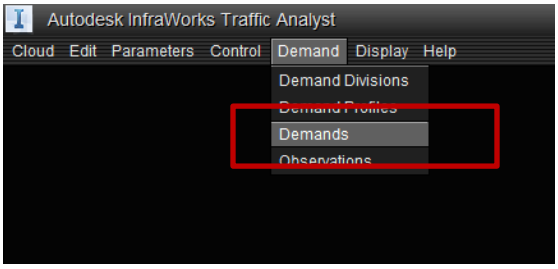


NOTE: LANES NEXT TO THE RIGHT OF THE FINAL MERGING POINT ARE CLOSED. TWO LANES WERE SELECTED. ALWAYS PAY CLOSE ATTENTION TO THE ENTIRE HIGHLIGHTED LANE. IF IT DOES NOT ENCOMPASS THE TOTAL LENGTH, SELECT ALL LANES TO EDIT THEM AND CLOSE THEIR BEHAVIOR.

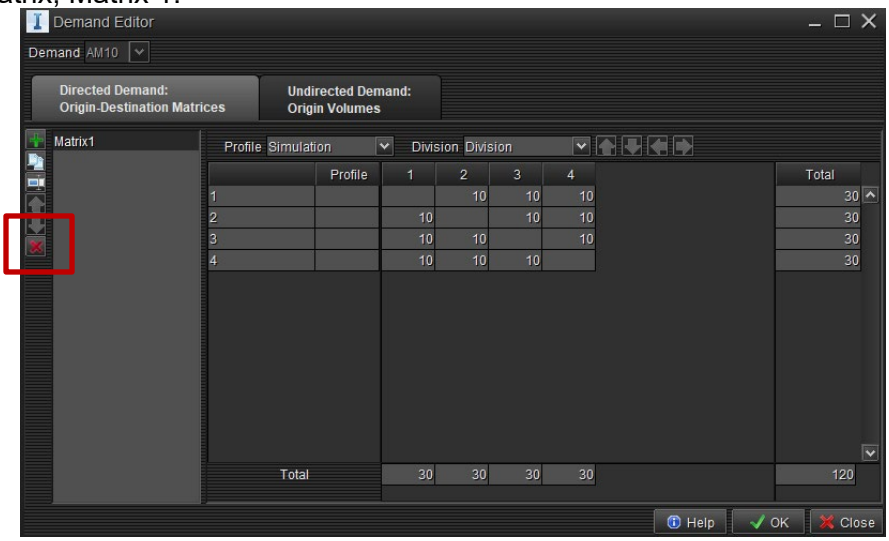
11. From the Autodesk InfraWorks Traffic Analyst menu, select Parameters > Terms. Under Simulation, change the Simulation term from 08:00 to 09:00. Select Apply and OK.



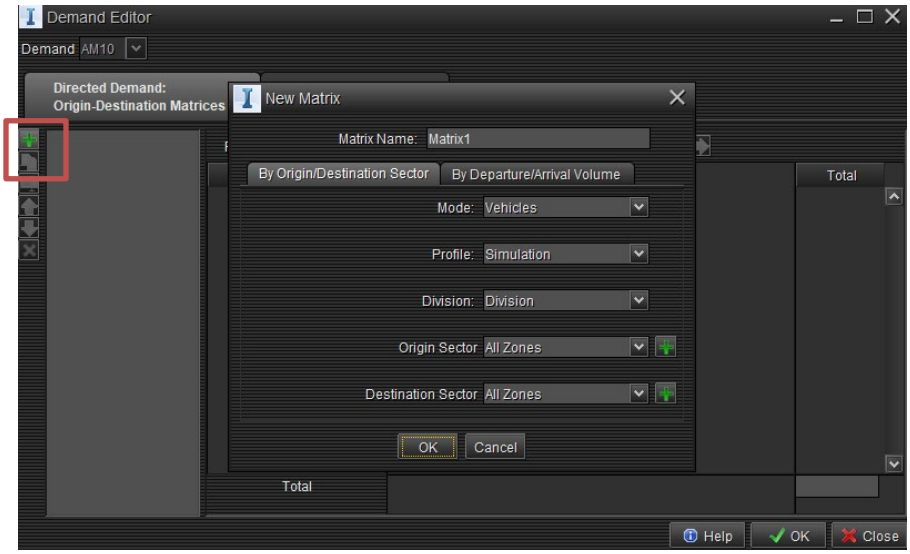
12. From the Autodesk InfraWorks Traffic Analyst menu, select the Demand tab, select Demands:



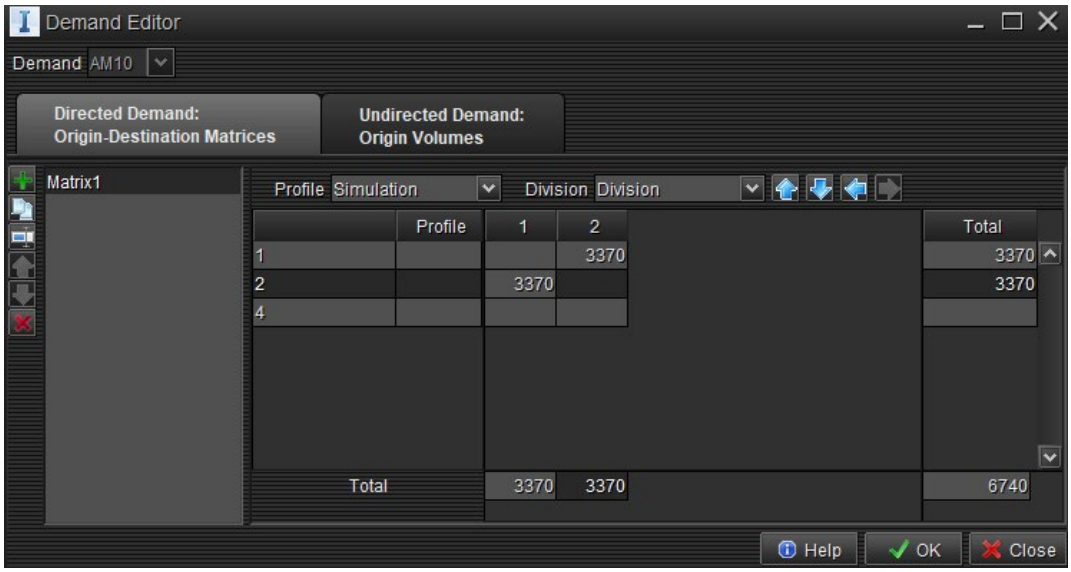
13. The Demand Editor dialog box appears. Select the X icon to delete the default Matrix, Matrix 1:



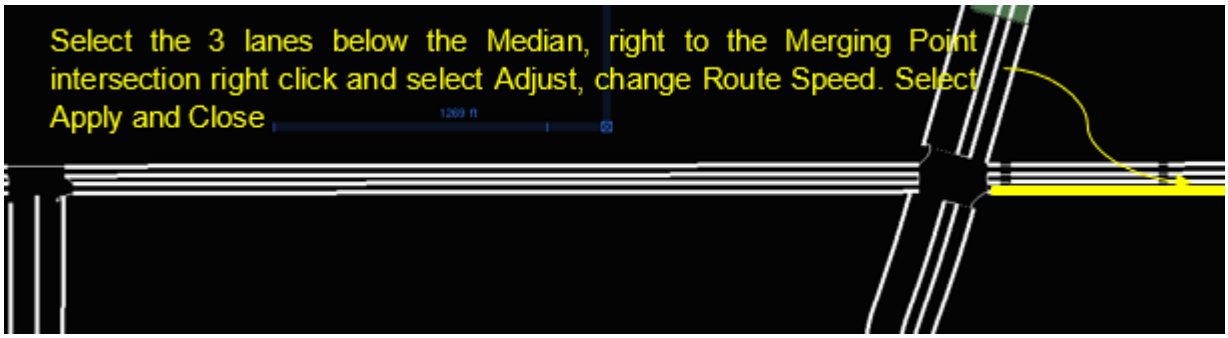
14. Select the + Sign icon on the left side. Select OK on the bottom of the dialog box:



15. Since we will only be simulating traffic on the Interstate, type in 3370 on the Zone 1 to Zone 2 box and 3370 on the Zone 2 to Zone 1 box. Select OK:

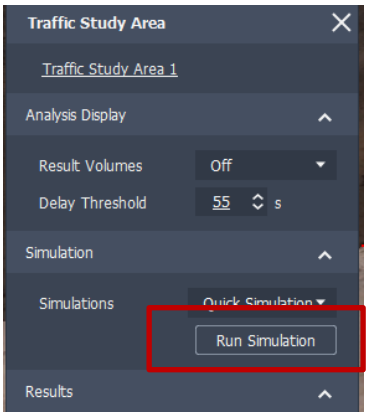


16. Select the 3 lanes below the Median, right to the Merging Point intersection, right click and Adjust, change Route Speed to 35 mph. Select Apply and Close:

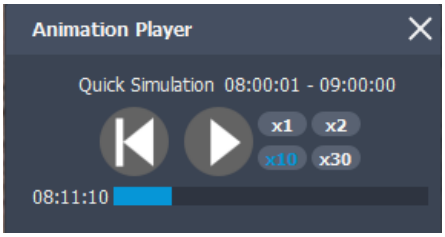


NOTE: SELECT ALL LANES ON ALL ROADS RIGHT OF THE INTERSECTION AND CHANGE SPEED

17. Close Autodesk InfraWorks Traffic Analyst. Go back to the InfraWorks Model and on the Traffic Study Area canvas, select Run Simulation:



18. On the Animation Player window, select the x10 speed and select Play:



19. MicroSimulation is run under Zipper merging behavior where drivers use fully all lanes until they reach the merging point and then alternate into the open lanes increasing efficiency, preventing backups, maximizing road space keeping traffic flowing:

20. On the Traffic Analyst canvas, select Results Volume Per Approach. A Level of Service Polygon is now displayed at each intersection: