

Vissim

(Version 11)

Module 3: Unsignalized Intersection

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Disclaimer: The objective of these modules is to bring new users sufficiently (and quickly) up to speed so they can use the manual and other resources when they have questions on model development. These modules should not be considered as official guidance; users should always refer to official PTV Vissim or project sponsor documentation for the final word on a model feature question. Send any errors, issues, or comments to michael.hunter@ce.gatech.edu so any corrections can be made to the material.

Vissim (11) Module 3 Overview

This is the third in a series of Vissim modules. The first module guided the user through the creation of a corridor which consisted of three, 4-approach fixed-time signalized intersections. The second converted these intersections to coordinated-actuated signal control. This module adds an unsignalized intersection to the model. In the fourth module you will incorporate a freeway interchange.

This tutorial will step through four main components of network creation required for unsignalized intersections:

1. Defining links and connectors: the “roads and intersections” of the network.
2. Setting traffic volumes and routing decisions.
3. Placing stop signs.
4. Defining conflict zones: zones that specify right-of-way where vehicle movements conflict.

Base Knowledge

For this module, it is assumed that you have a basic understanding of:

- Starting Vissim
- Navigating the GUI (Graphical User Interface)
- Links
- Connectors

Information on these features may be found in [Module 1 - Basic Three Intersection Model Setup](#).

IMPORTANT: SAVE FREQUENTLY AS YOU WORK!

Open Module 2 Vissim File

As a first step, we will open the **Module 2** Vissim .inpx, as this module builds on the simulation constructed in **Module 2**.

- Step i: Go to *Start* → *PTV_Vision 2018* → *VISSIM 11*.
- Step ii: Left-click the *File* pull down menu.
- Step iii: Left-click *Open*.
- Step iv: Find the **Module 2** file and left-click on it. (The file will be wherever you saved it when you completed **Module 2**.)

(The above assumes a computer running Windows 10, start-up may be slightly different for other operating systems or installations. If you receive a start-up error you are likely having an installation or license issue, please contact your IT support.)

From **Module 2** you should have the network backbone seen in Figure 1.

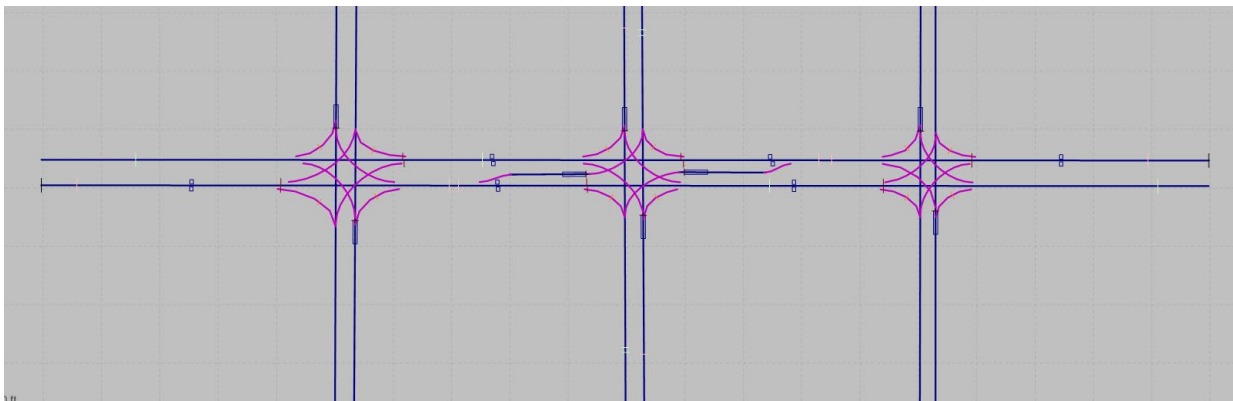


Figure 1: Existing Network Layout

Save the file under a new name

As a first step to updating the signal control save the Vissim file under a new name. This will allow you to keep your original **Module 2** input file.

- Step i: Left-click the *File* pull down menu.
- Step ii: Left-click *Save as...*
- Step iii: In the *File name* box enter the new file name, for example, *Module 3*. Make sure you are in the folder you wish to save your **Module 3** work.
- Step iv: Left-click *Save*, be sure to note where you are saving the file!

If a pop-up window asks if you want to save your previous results left-click *No*.

CRITICAL CONCEPT (Reminder)

When you completed [Modules 1 and 2](#) you saw that when you save an intersection *RBC* file it is saved as a SEPARATE file from the Vissim input .inpx file. The .inpx links to the RBC files. When you save your Vissim model under a new name you are updating the .inpx file ONLY, the new Vissim file .inpx continues to link to the same *RBC* files!

Thus, if you now made changes to the RBC signal parameters in your [Module 3](#) network you would ALSO BE CHANGING THE FILES USED BY THE [MODULE 2 SIMULATION FILE](#). If you then ran the [Module 2](#) file it would use the updated RBCs. When we created [Module 2](#) we renamed the RBC files so the [Module 1](#) model would not be affected by changes made in [Module 2](#). For [Module 3](#) we will not be altering the intersection RBC so we will not rename the files, as we will only be adding an unsignalized intersection in this module. However, remember, if you do decide to make a change to an *RBC* this means it will also affect future [Module 2](#) model runs. If you want to be extra safe you can go ahead and save [Module 3](#) versions of the RBC files. Instructions for this may be found in [Module 2](#).

Building the model part 1: *Links and Connectors*

Create Links and Connectors for the new intersection

In this section you will add the intersection of Varsity Way and Burdell Blvd to the Module 2 network, as seen in **Figure 2**.

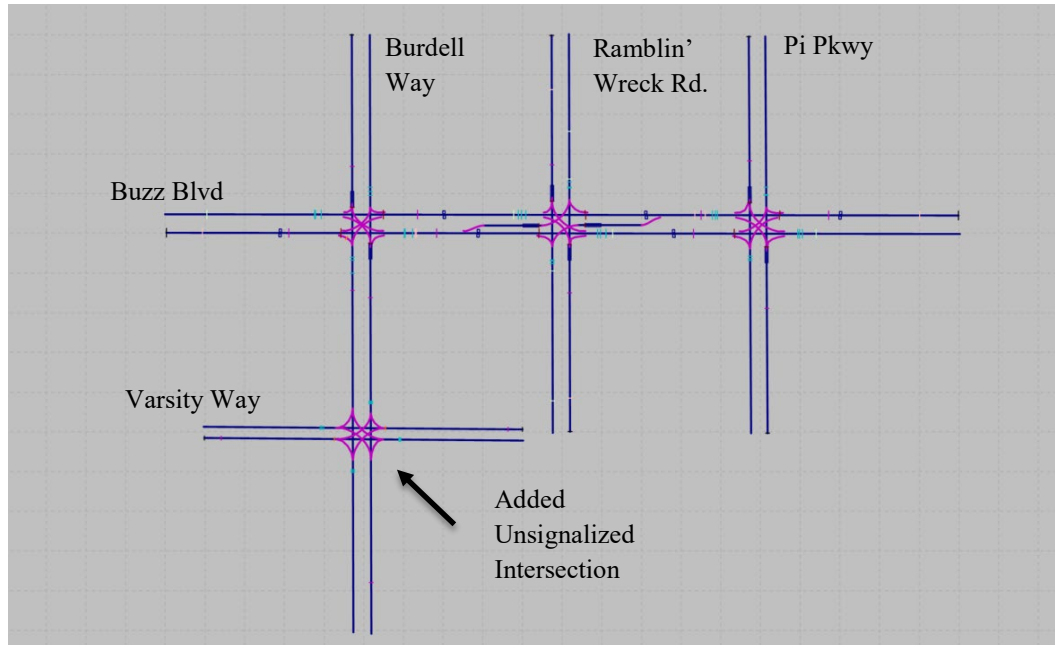



Figure 2: Link Layout in Network Editor Window

Extend Burdell Blvd Roadway Centerline

First, let's extend the NB approach (i.e., the approach on the south side) of Buzz Blvd and Burdell Dr. by approximately 500 ft. To extend the link:

- step i. Left-click the *links* icon:  in the left toolbar.
- step ii. Left-click on the NB link. Select the end of the link with a left-click.
- step iii. Drag the mouse south approximately 500 ft and release the button
- step iv. Repeat steps ii and iii for the southbound link.

Helpful Hint

While dragging the mouse, the *link* length and the x- and y-offsets are visualized in a pop-up window with the mouse icon (Vissim 11 feature). The x- and y-offsets are the amount that the *link* end position moves from its starting position. So, for this example drag until the y-offset reaches approximately -500 ft and keep the x-offset at 0.

Add new intersection cross street

About halfway between Buzz Blvd and the new end of the Burdell Dr. links let's add the new Varsity Way cross street.

step v. Right-click about 400 ft to the west of Burdell Blvd and drag the mouse pointer to the east, about 400 ft past Burdell Blvd. When you reach the end of the *link* and release the mouse button, the *Link Window* containing the *link* data will pop-up (Figure 3).

- Set the *number of lanes* equal to 1.
- Type in the roadway name (Varsity Way EB) in the *Name* box.

step vi. Select *OK* to close the *Link Window*.

Count	Index	Width	BlockedVeh	DisplayType	NoLnChLAI	NoLnChRAI	NoLnChLVI	NoLnChRVI
1	1	12.00			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 3: Link Data Pop-up Window

step vii. Press CTRL + Right-click on the *link*, and click on *generate opposite direction*. Select 1 for the number of lanes. This generates a link of equal length in the opposite direction.

step viii. Double click on the link to open the dialogue box and name the link Varsity Way WB.

Add Connectors

Create intersection connectors

You may find it helpful to position this intersection in the center of your screen and zoom in. Also, you may want to left-click on one of the cross-street links (say EB) and drag it until the EB and WB links are about 25 ft apart. I find the default distance tends to make the intersections look too tight. Let's add the connector for the EB movement's left turn, from Varsity Way EB to Burdell Blvd NB.

- step i. With the right mouse button click at the desired start position on the *link*, where the turning vehicle would begin its turn movement.
- step ii. Drag the mouse in the direction of flow to the position on the receiving link where the vehicle will merge with the link.
- step iii. Release the mouse button. Upon releasing the button the *Connector* edit window will pop-up.
- step iv. Add a *Name*, e.g., Varsity and Burdell EB LT.
- step v. As Burdell Blvd and Varsity Way are both two-lane roadways (one in each direction) the *From Link* and *To Link* boxes should both have only *Lane 1*.
- step vi. Change the *spline* value to 10. We will use 5 points for right turns and 10 points for left turns, although feel free to select different values if you are not satisfied with the roundness of the turn. (This is simply for visualization; the radius of the curve does not affect vehicle operations.)
- step vii. Keep all the other default settings and click *OK*.

Figure 4 provides an example *Connector* dialogue window.

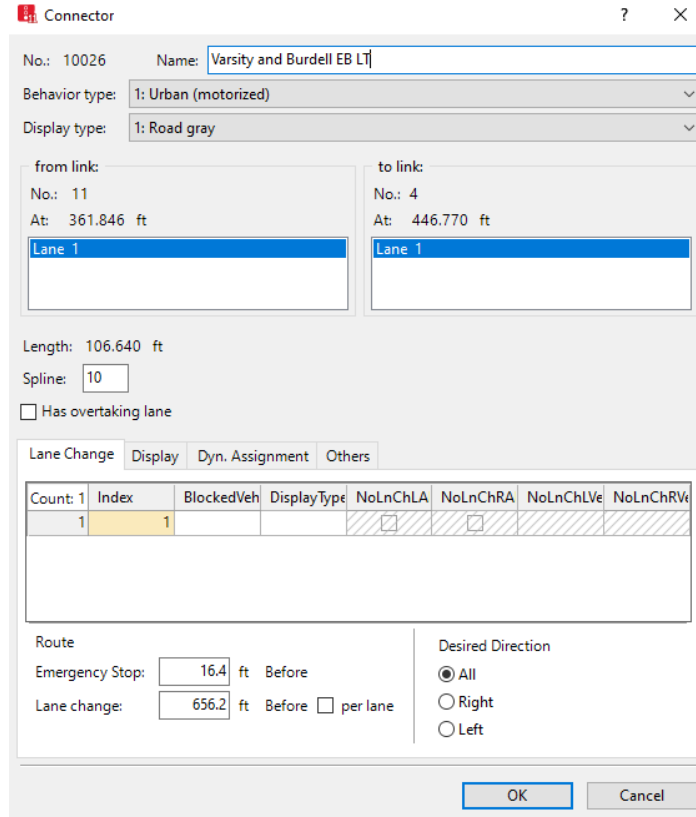


Figure 4: Connector Dialogue Window, EB left at Burdell Blvd and Varsity Way

Repeat the procedure for every movement of the intersection. There should be a total of 8 connectors, allowing for left and right turns from all four approaches. Figure 5 shows the connector layout for the intersection of Varsity Way and Burdell Blvd.

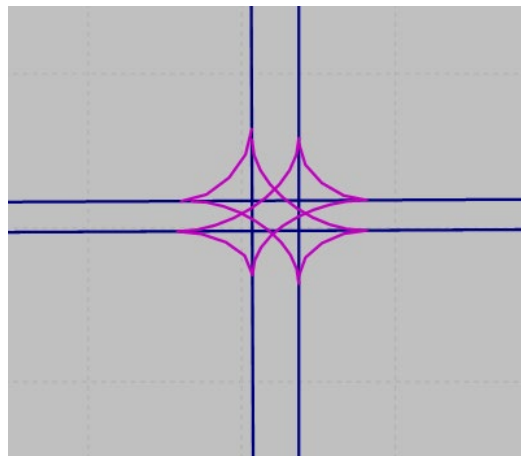



Figure 5: Connector layout for Varsity Way and Burdell Blvd intersection

Save Often!

Building the Model Part 2: Traffic Volume and Routing Decisions

Next, we need to add the cross-street traffic volumes and set the turn movements (i.e., routing decisions) for the new intersection.

3.1 Traffic Volume

- step i. Click the *Vehicle Inputs* icon: .
- step ii. Left-click a link to activate it, then right-click on the link to insert a vehicle input. For example, left-click the Varsity Way EB link. A black line will appear at the start of the link (Figure 6) and the *Vehicle Inputs* chart (Figure 7) will appear under the *Network Editor* window. The *Vehicle Inputs* chart will show the new input as well as those that are already in the model.

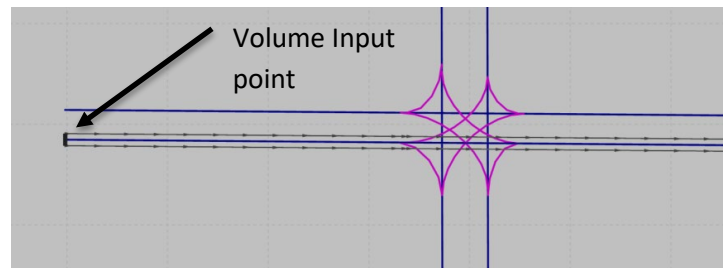


Figure 6: Volume input point

- step iii. In the input chart enter a name, number (it is ok to use the default), and volume for each section of the roadway.
- step iv. For our example use 150 veh/hr for the Varsity Way EB and WB entry volumes (remember, volumes are entered as hourly flow rates).
- step v. Keep all other default settings.
- step vi. Repeat steps ii through step v for Varsity Way WB.
(We don't need to add volumes for Burdell as we did that in Module 1, making the link longer did not affect the volume inputs.)


Vehicle Inputs / Vehicle Volumes By Time Interval					
Count	No	Name	Link	Volume(0)	VehComp(0)
1	1	Buzz Blvd, EB inp	1: Buzz Blvd EB	1800.0	1: Default
2	3	Burdell Dr., SB inp	3: Burdell Dr. SB	300.0	1: Default
3	4	Ramblin St., NB inp	6: Ramblin St. NB	300.0	1: Default
4	5	Ramblin St., SB inp	5: Ramblin St. SB	300.0	1: Default
5	6	Pi Pkwy, NB inp	8: Pi Pkwy NB	300.0	1: Default
6	7	Pi Pkwy, SB inp	7: Pi Pkwy SB	300.0	1: Default
7	8	Buzz Blvd, WB inp	2: Buzz Blvd WB	600.0	1: Default
8	9	Varsity Way EB	11: Varsity Way E	150.0	1: Default
9	10	Varsity Way WB	12: Varsity Way	150.0	1: Default

Figure 7: Complete Vehicle Inputs table

Helpful Hint

If you want to see the *Vehicle Inputs* Icon (or the list for any other *Network Object*) right-click on the right side of the *Network Object* Icon and select *Show List*. There are other handy features in this *Network Object* icon menu. For instance, right-click the *Vehicle Inputs* icon, left-click *Edit Graphics Parameters*, check the *Label Visibility* box, left-click the three small dots (...) in *Label attributes*, select *Name* in the pop-up window, select *OK*, select anywhere in the *Network Editor* Window outside the pop-up window. All of the vehicle inputs should now be labeled with their name. You can label the inputs with any of the attributes listed in the pull-down window where you selected *Name*. For instance, *Volume*, which can be helpful in checking your inputs. To remove the label repeat the above steps and uncheck the *Label Visibility* box.

3.2 Routing Decisions

- step i. Left-click the *Vehicle Routes* icon: 
- step ii. Left-click a *link* that enters an intersection. Let's start with the EB approach on Varsity Way.
- step iii. Right-click a point inside the *link* approximately 300 ft from the intersection, Figure 8. A bar will appear at that location on the *link*, this is your routing decision starting point.

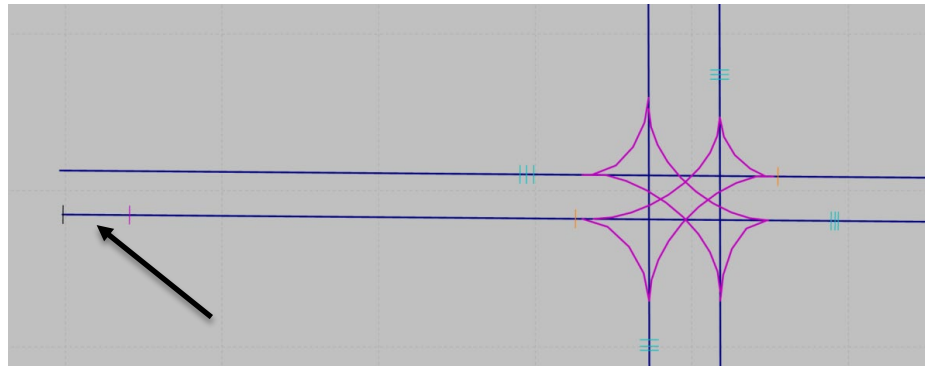


Figure 8: Routing decision start

CRITICAL CONCEPT

When placing the starting point of the routing decision it must be sufficiently upstream of the signal head to allow a vehicle adequate time to change lanes (if necessary) and/or react to the signal head after crossing the routing decision. If an adequate distance is not provided vehicles may have insufficient time to change lanes and create unrealistic blocking or may even ignore the signal head, driving through the red. Generally, I tend to place the routing decision upstream as far as possible, without overlapping other routing decisions. The placement of routing decisions may be calibrated when reviewing the model to reflect the observed (or expected) lane changing behavior. Although, for this particular intersection all approaches are single-lane so lane-changing behavior is not an issue.

- step iv. Next, define one of the possible routing destinations. Move the mouse just downstream of the routing start point, left-click, and drag the created blue line to a point 50 ft past the intersection on the path that would be traversed by a through vehicle. You will see the blue bar at the decision endpoint and the path will be highlighted in yellow, Figure 9.

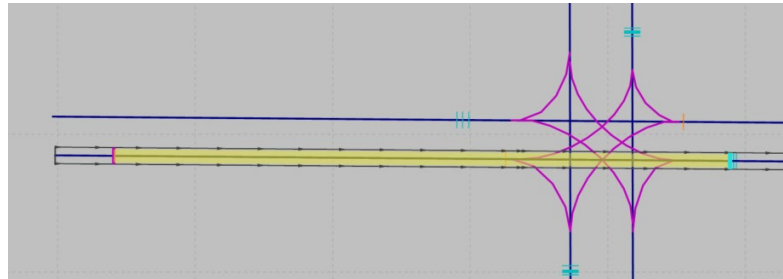


Figure 9: Through vehicle route

- step v. Next, move the mouse to a point 50 ft past the intersection on the path that would be traversed by a left-turning vehicle. Left-click. You should again see the path highlighted in yellow, Figure 10.

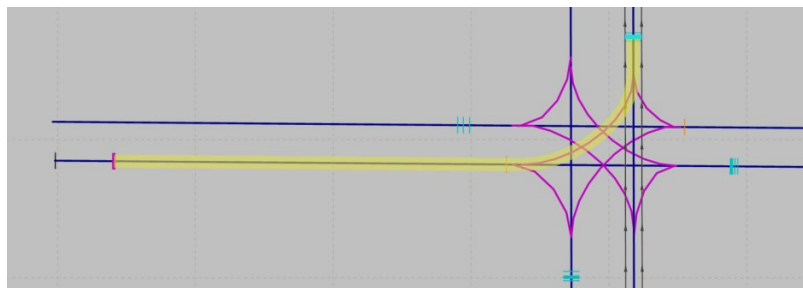


Figure 10: Left turn vehicle route

- step vi. Next, move the mouse to a point 50 ft past the intersection on the path that would be traversed by a right-turning vehicle. Left-click. You should again see the path highlighted in yellow, Figure 11.

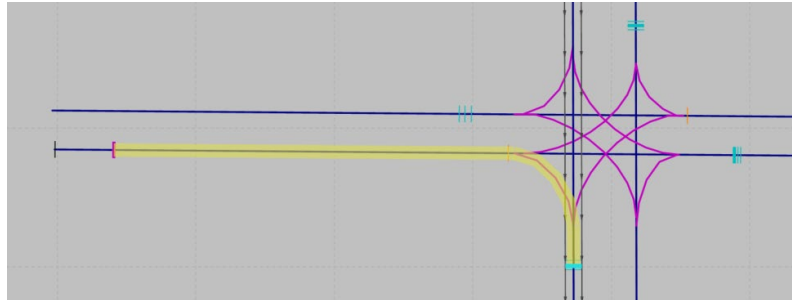


Figure 11: Right turn vehicle route

- step vii. Left-click on the map screen anywhere that is not a link or connector (the mouse pointer will become an X). The *Static Vehicle Routing Decisions* Box should appear at the bottom of your screen, Figure 12. (Or, as seen in Helpful Hints, to open the *Static Vehicle Routing Decisions* window (if it is not currently open) right-click on *Vehicle Routes* in the *Network Objects* menu, select *Show List*.)

The left-hand side of the box lists all the *routing decision* starting points that have been created and the right-hand side lists all of the destination points associated with the starting point selected in the left-hand box. If you click on a route in the right-hand box it will be highlighted on the map. For example, in Figure 12 on the right side of the second row, we have clicked the Varsity Way EB Left turn route just created (we will add labels next). Note, routes are listed in the order created.

- step viii. In the *Vehicle Routing Decisions* window left click on the Varsity Way EB routing decision (if you have not already done so).
- step ix. On the left side of the *Vehicle Routing Decisions* window enter the *Name* of the route starting point you just added, i.e., Varsity and Burdell, EB App.
- step x. In the chart on the right enter the names for each route, e.g., Thru, LT, and RT. You can select the row for the route to see it highlighted in the model, making sure you are assigning the correct name.
- step xi. In the chart on the right, in the *RelFlow* column, insert the relative flow for each route. For the EB traffic use 30 left, 105 through, and 15 right. Be sure you are assigning the flow to the correct movement. Remember, you could also enter a relative flow of 0.2 left, 0.7 through, and 0.1 right and get the same result, as Vissim converts the values entered to the relative (percent) flow for each movement.

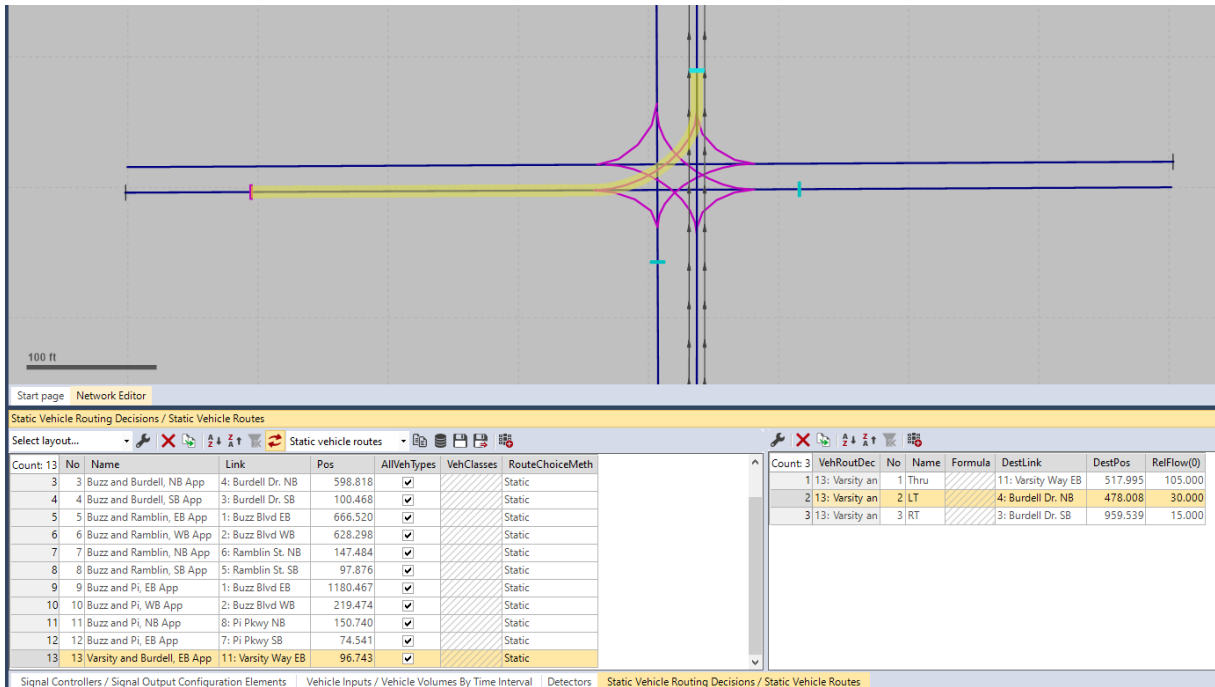


Figure 12: Static Vehicle Routing Decisions

step xii. When you are ready to set your next set of routing decisions left click on the map away from any links or connectors.


step xiii. Repeat the process for the remaining three approaches: WB, SB, and NB. Use the volumes in Table 1. (Notice, the routing decision at Buzz Blvd and Burdell Dr. was not affected by increasing the link length, with the routing starts remaining in the original location.)

Table 1 Intersection Volume Counts

	EB			WB			NB			SB		
	L	Th	R	L	T	R	L	T	R	L	T	R
Varsity Way and Burdell Blvd	30	105	15	15	105	30	25	500	75	25	450	25

Building the Model Part 3: Stop Signs


Varsity Way and Burdell Blvd will be a two-way stopped controlled (TWSC) intersection. Thus, the next step is to place the stop control on the Varsity Way approach.

- step i. Left-click the *Stop Signs* icon: .
- step ii. Left-click the Varsity Way EB link.
- step iii. Right-click directly upstream of the connectors diverge point. IMPORTANT: If the stop sign is placed after (downstream) the *connectors* diverge point the connector traffic will ignore the stop sign. (This is an item to check when reviewing a model, if you notice turning movements are ignoring a stop sign.)
- step iv. The *Stop Sign* dialogue window will pop-up.
- Enter a *Name*: e.g., Varsity Way EB.
 - Check that the *link* and *lane* is correct, in the example, it is 11 – 1 (i.e., *link – lane*).
 - You do not need to enter any information in the RTOR, this is for using a stop sign to implement RTOR at a signalized intersection.
- step v. Repeat steps ii to iv for the Varsity Way WB approach.

Reminder: Be sure you are saving the model often as you proceed.

Building the Model Part 4: Conflict Areas

Next, in order to avoid collisions at the crossing or merge points, it is necessary to set up *Conflict Areas*. At each conflict or merge point (not controlled by a signal) it is necessary to define the right-of-way among the permitted movements. We will set up the right-of-way for a TWSC intersection with Varsity Way stopped controlled.

- step i. Left-click the *Conflict Area* icon: . This will result in all possible conflict areas being highlighted. When a conflict area is undefined (i.e., *passive*), both approaches will be highlighted yellow. Figure 13 shows the Varsity Way and Burdell Blvd Intersection conflict zones prior to setting them.

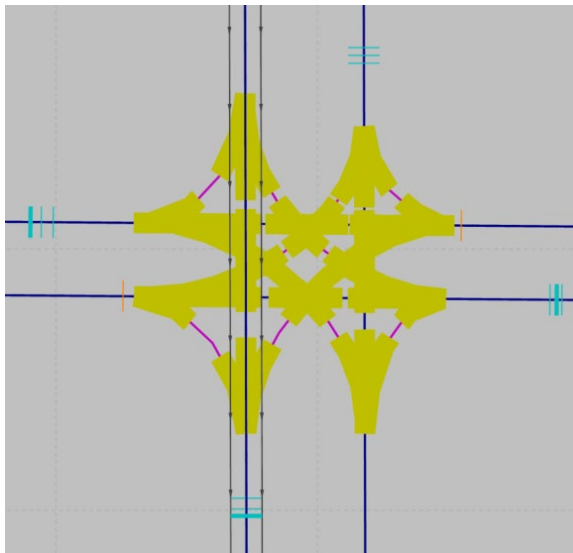



Figure 13: Varsity Way and Burdell Blvd Conflict Areas Prior to Right-of-Way Definition

- step ii. Right click on the *Conflict Area* icon and left-click on *show list*. The list of all conflict zones in the model will appear below the *Network Editor* window.
- step iii. Let's set a filter on the in the *Conflict Areas* list to reduce the list size. In the *Conflict Area*, *Link2* column, left-click the filter icon (). At the top of the pop-up window, select *Contains text* and enter "Varsity" in the box, Figure 14. Now only that *conflicts* with the term "Varsity" in the *Link2* column will show. You should have a total of 40 conflicts listed. Of these we will define the merge (12) and crossing conflicts (16), we do not need to worry about the diverging conflicts (12) at the moment.

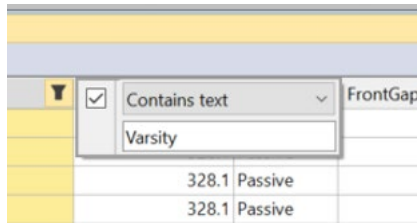


Figure 14: Conflict Areas Filter Pop-Up Window

Helpful Hints

This is where the importance of naming our objects is seen. Your model likely has over 150 conflict areas. Using the link names to find the conflicts related to Varsity Way and Burdell Way will greatly simplify your task.

- step iv. Left-click in the *Network Editor* the *conflict area* you wish to define (or select the row in the *Conflict Areas* list, this will highlight that conflict for that row). Let's start with Burdell Blvd SB Crossing Varsity Way EB, Figure 15(a)
- step v. In the *Network Editor* window right-click on the highlighted conflict until the zone is correctly defined. The movement colored green has the right-of-way and the movement colored red will yield. Figure 15(b) shows the SB through with priority over the EB through. (If you accidentally define an area you did not intend to define continue clicking until both movements return to yellow.)

Helpful Hints

You can also set the conflict definition in the *Conflict Areas* list, *Status* Column. For the selected conflict choose either 2 waits for 1 (i.e., Link 2 waits for Link 1), 1 waits for 2, undetermined (vehicles see each other but remain in current sequence), or passive (vehicles do not see each other and will "drive over" each other).

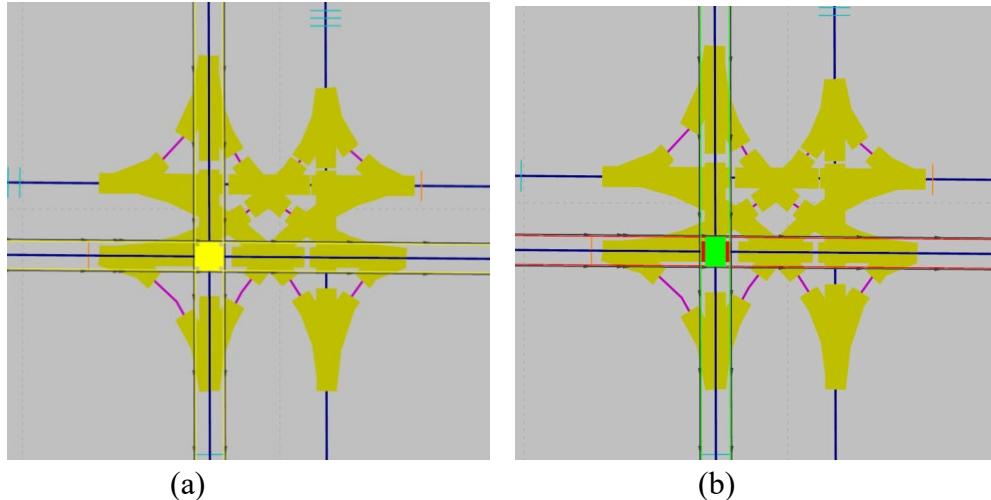


Figure 15: Burdell Blvd SB and Varsity Way SB (a) conflict area highlighted, (b) conflict movement priorities

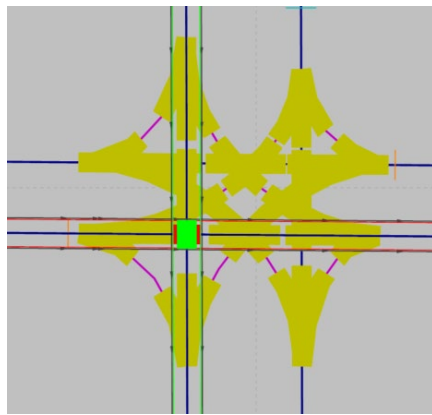
step vi. Select and define the remaining conflicts. You need to define a total of 28 conflict areas (16 crossing and 12 merging):

Crossing Conflicts:

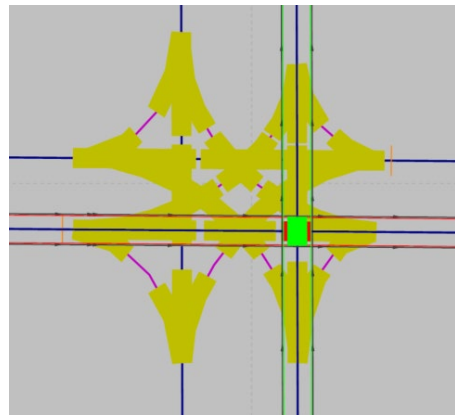
- Through movement conflicts - four total. Burdell Blvd (NB-SB) through always receives priority as Burdell Blvd is the uncontrolled roadway, Figure 16.
- Left turn crossing opposing through movement - four total. The through movements receive priority, Figure 17.
- Left turn crossing cross street traffic from the left - four total. Burdell Blvd movement receives priority, Figure 18.
- Left turn crossing left turn - four total. Burdell Blvd (NB-SB) receives priority, Figure 19.

Merging Conflicts:

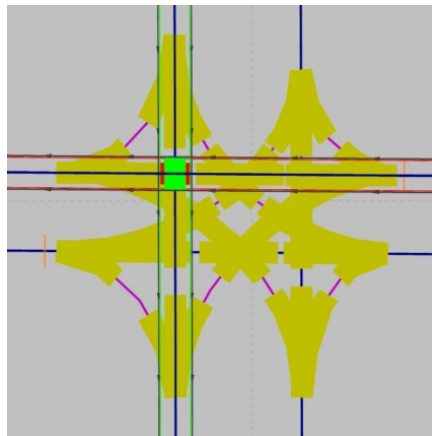
- Right turn merging with cross street through - four total. Burdell Blvd movement receives priority, Figure 20.
- Left turn merging with cross street through - four total. Burdell Blvd movement receives priority, Figure 21.
- Left turn and opposing right turn entering into the same receiving lane - four total. Always give the right turn priority, Figure 22.



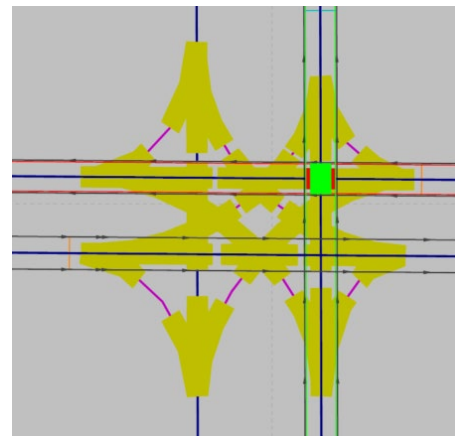
(a)



(b)

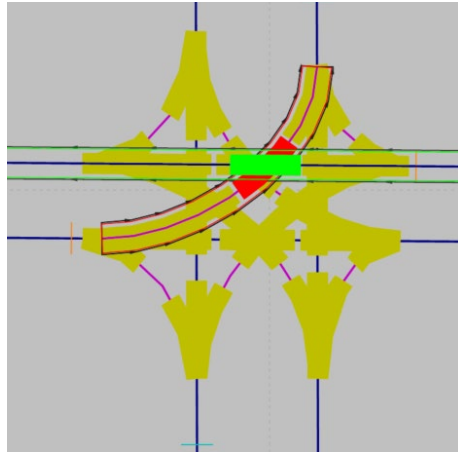


(c)

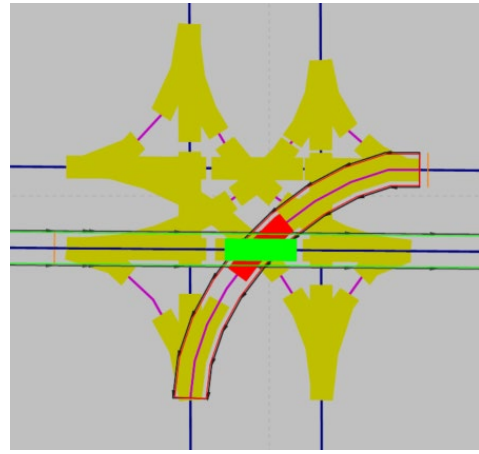


(d)

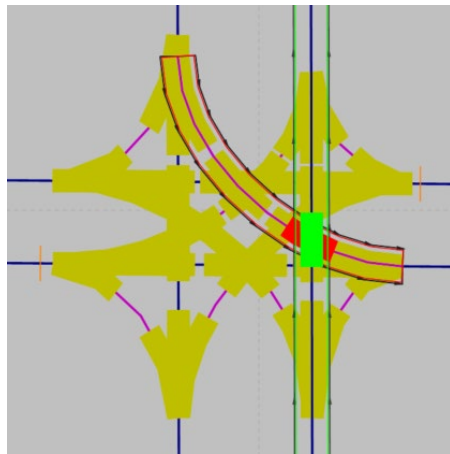
Figure 16: Conflict Area Definitions: (a) Burdell Blvd SB & Varsity Way EB, (b) Burdell Blvd NB & Varsity Way EB, (c) Burdell Blvd SB & Varsity Way WB, and (d) Burdell Blvd NB & Varsity Way WB



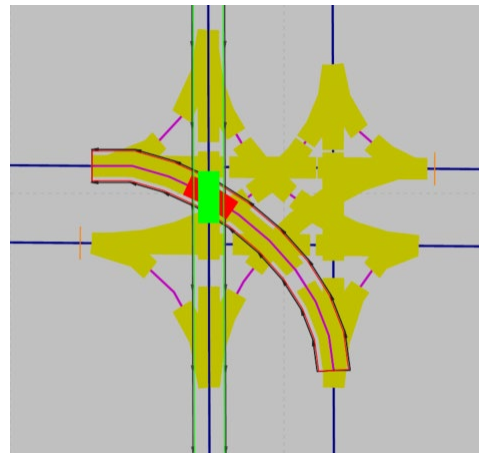
(a)



(b)

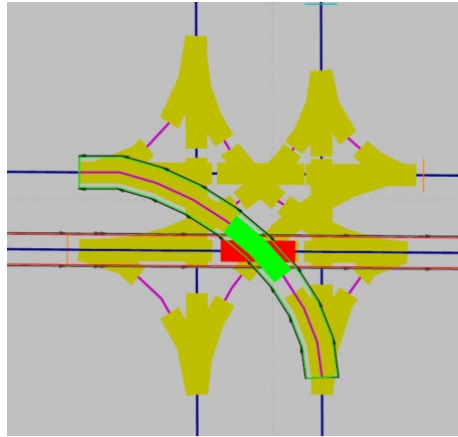


(c)

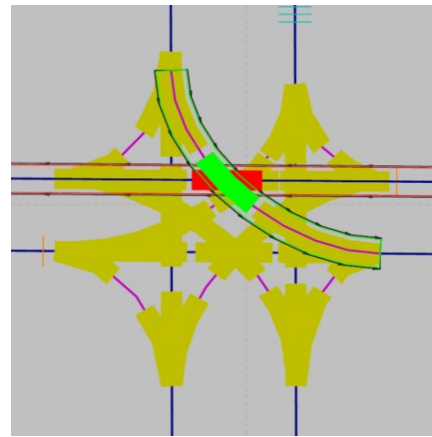


(d)

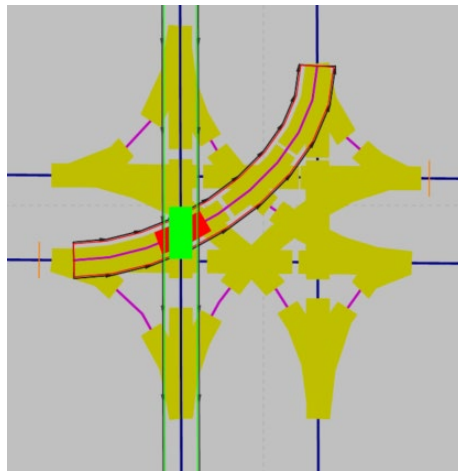
Figure 17: Conflict Area Definitions: (a) Varsity Way WB & Varsity Way EB LT, (b) Varsity Way EB & Varsity Way WB LT, (c) Burdell Blvd NB & Burdell Blvd SB LT, and (d) Burdell Blvd SB & Burdell Blvd NB LT



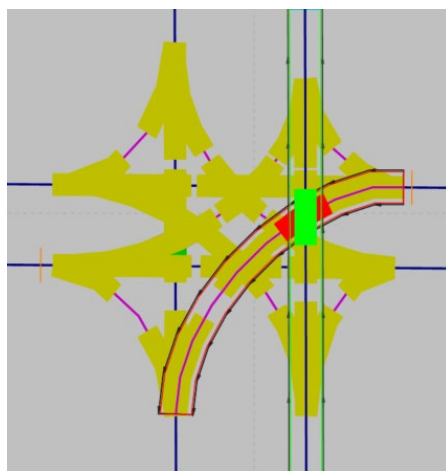
(a)



(b)



(c)



(d)

Figure 18: Conflict Area Definitions: (a) Varsity Way EB & Burdell Blvd NB LT, (b) Varsity Way WB & Burdell Blvd SB LT, (c) Burdell Blvd SB & Varsity Way EB LT, and (d) Burdell Blvd NB & Varsity Way WB LT

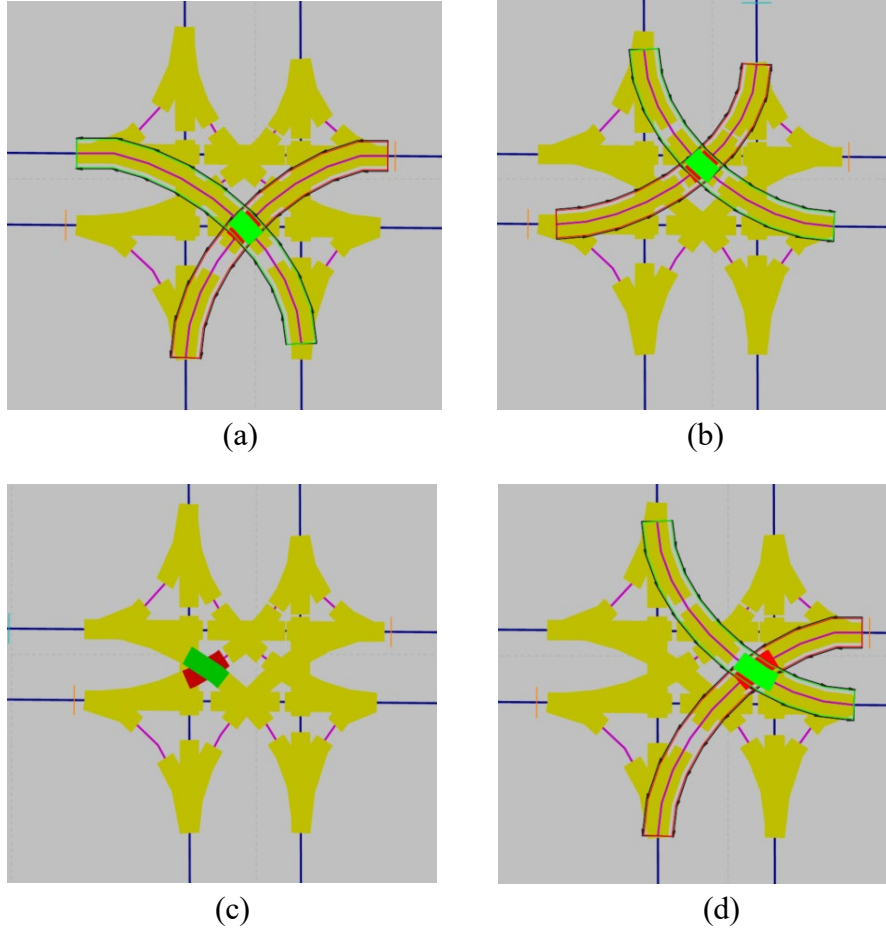
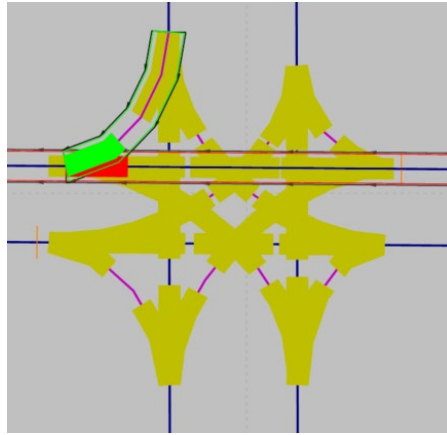
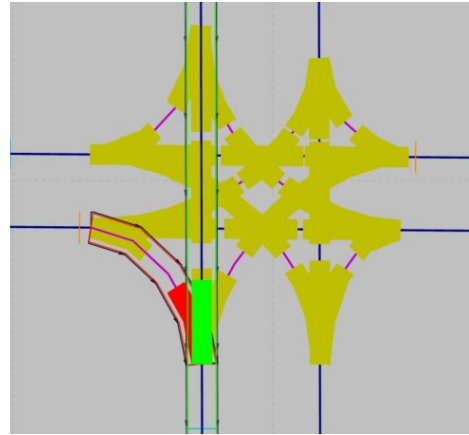


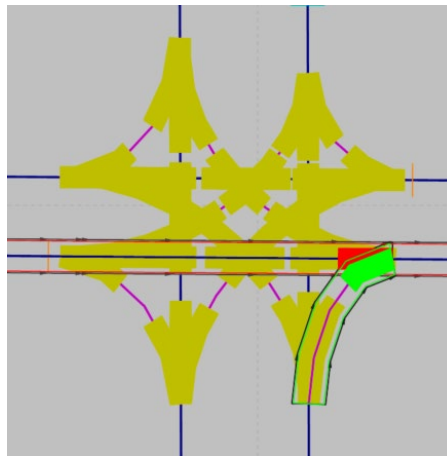
Figure 19: Conflict Area Definitions: (a) Burdell Blvd NB LT & Varsity Way WB LT, (b) Burdell Blvd SB LT & Varsity Way EB LT, (c) Burdell Blvd NB LT & Varsity Way EB LT, and (d) Burdell Blvd SB LT & Varsity Way WB LT



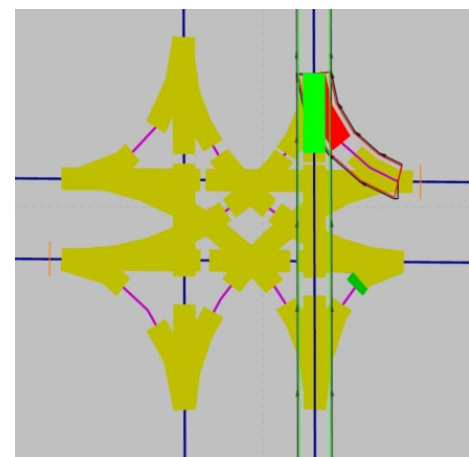
(a)



(b)

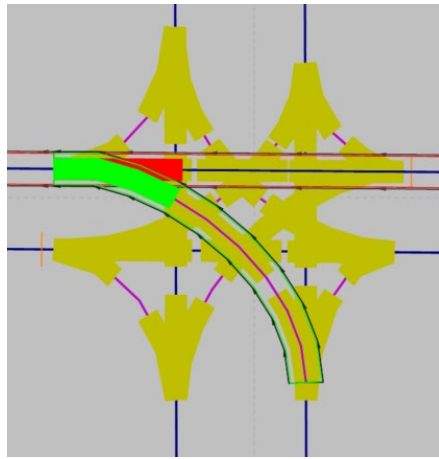


(c)

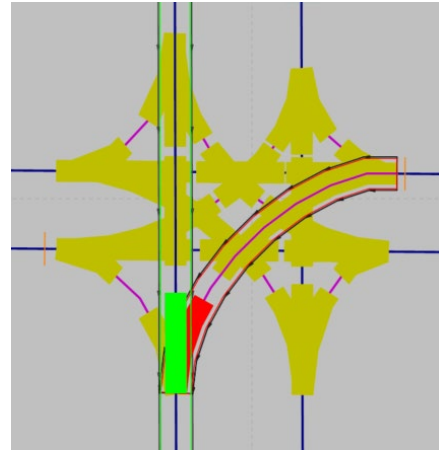


(d)

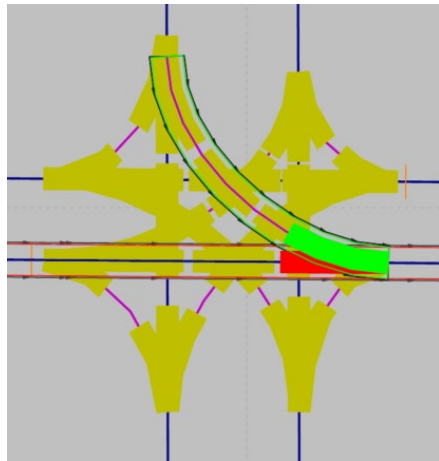
Figure 20: Conflict Area Definitions: (a) Burdell Blvd SB RT & Varsity Way WB, (b) Burdell Blvd SB & Varsity Way EB RT, (c) Burdell Blvd NB RT & Varsity Way EB, and (d) Burdell Blvd NB & Varsity Way WB RT



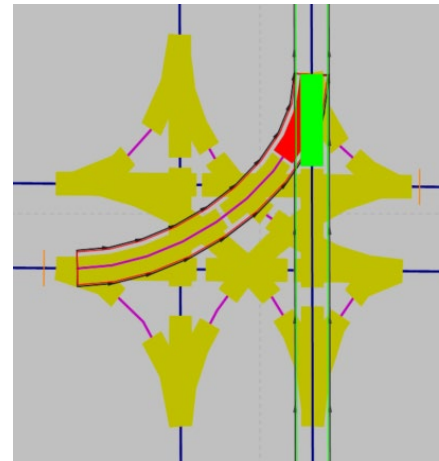
(a)



(b)

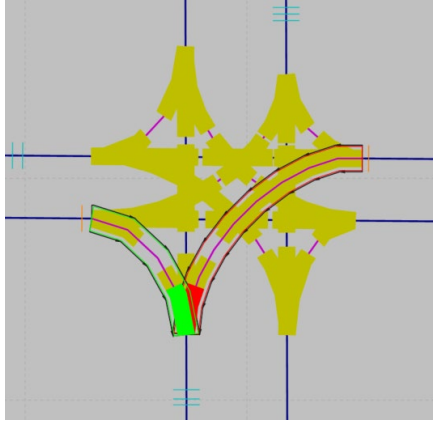


(c)

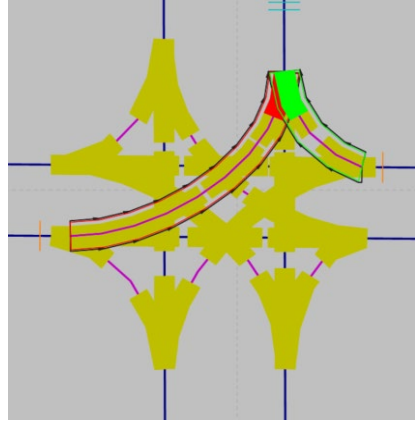


(d)

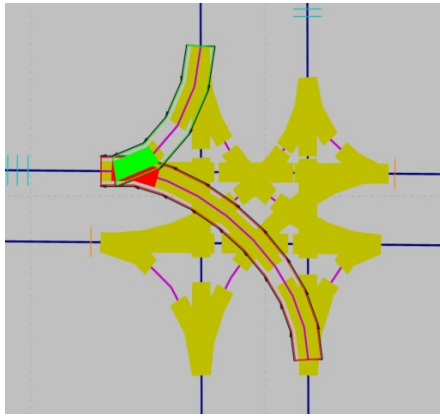
Figure 21: Conflict Area Definitions: (a) Burdell Blvd NB LT & Varsity Way WB, (b) Burdell Blvd SB & Varsity Way WB LT, (c) Burdell Blvd SB LT & Varsity Way EB, and (d) Burdell Blvd NB & Varsity Way EB LT



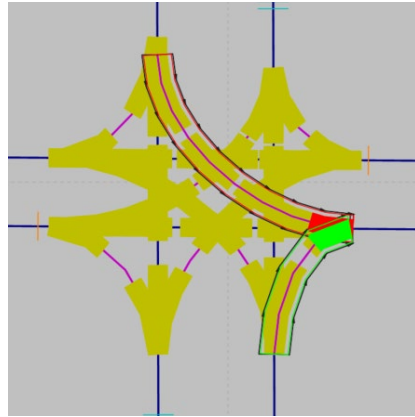
(a)



(b)



(c)



(d)

Figure 22: Conflict Area Definitions: (a) Varsity Way WB LT & Varsity Way EB RT, (b) Varsity Way EB LT & Varsity Way WB RT, (c) Burdell Blvd NB LT & Burdell Blvd SB RT, and (d) Burdell Blvd NB RT & Burdell Blvd SB LT

Burdell Blvd & Varsity Way with all conflicts defined should look similar to Figure 23.

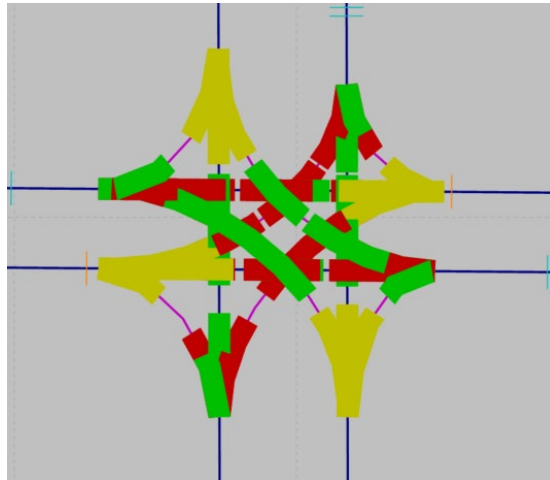


Figure 23: Burdell Blvd & Varsity Way with all conflicts defined

For this intersection, we will leave the 12 diverge movements as passive (both movements yellow). This means the movements will not hinder each other. For example, if an NB right turn stops while waiting to turn right it will not hinder a through vehicle behind it. That is, it is assumed the field behavior would be for the through vehicle to go around the waiting right turn vehicle. If the diverge would cause blockage then switch the movements to undetermined (i.e., both movements red). In this case, the through movement would not go around the right turn and wait until the right turn was able to successfully proceed. The modeling of diverging conflicts as passive or undetermined should be set according to the observed (or expected) behavior in the field.

This would be a good time to save your file!

Go ahead and run the model. Carefully observe the traffic as it goes through the intersection of Burdell Blvd and Varsity Way. Are the vehicles behaving as you expect? Does the Burdell Blvd traffic have the right-of-way? Is the Varsity Way traffic-stopping? Be sure that you spend some time observing all of the different potential conflicts to ensure that the model is behaving correctly. If it is not go back into the model and make sure the conflicts are correctly set, the stop bars are placed upstream of the connectors, routing decisions are set sufficiently upstream, etc.

CONGRATULATIONS!!!

**You have completed your
first unsignalized VISSIM
model!**

Great Work!!!

