

VISSIM TUTORIALS

This document includes tutorials that provide help in using VISSIM to accomplish the six tasks listed in the table below.

Number	Title	Page Number
1	Adding actuated signal control to an existing network	2
2	Setting simulation parameters	10
3	Evaluation outputs	11
4	Changing input volumes	14
5	Setting left turn and right turn volumes to zero	15
6	How to set up permitted Left turn phasing	16

Tutorial #1: Adding Actuated Signal Control to an Existing VISSIM Network

This tutorial describes the procedure to modify an existing VISSIM network that does not include three important components: the signal controller, the signal heads, and the detectors. Detailed information about these elements can be found in the VISSIM online help.

Step 1. Define Movement Numbers

Your first step is to define the movement numbers for your intersection using a two digit format. The first digit of the designation should correspond to the standard NEMA numbering for that movement. The second digit starts at one for the inner most lane for a given movement and increments by one for each additional lane serving a movement. For example, for the WB approach in Figure 1, the lanes are numbered 61, 62, and 63. These numbers will be used for the signal head numbers and detector numbers discussed on the following pages.

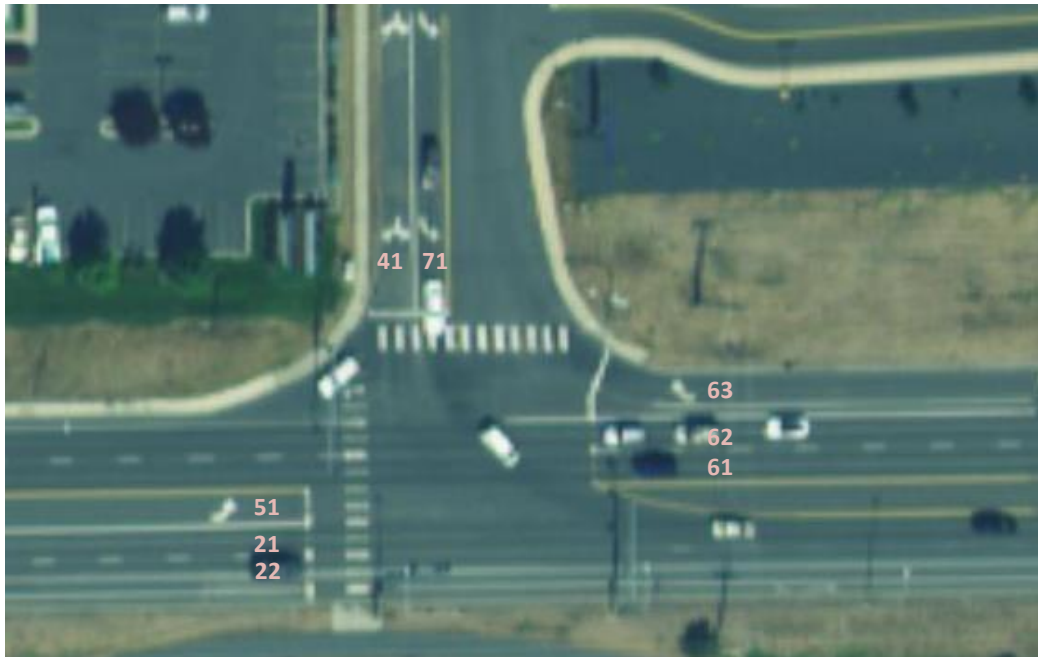


Figure 1. Defining movement numbers

Step 2. Create Signal Controller

In VISSIM, every signal controller (SC) is represented by its individual SC number and signal groups (or phases) as its smallest control unit.

- Select "Signal Control", then "Signal Controllers".
- Right click in the area noted in the figure and then click "add" in the pop up menu to establish a new signal controller.

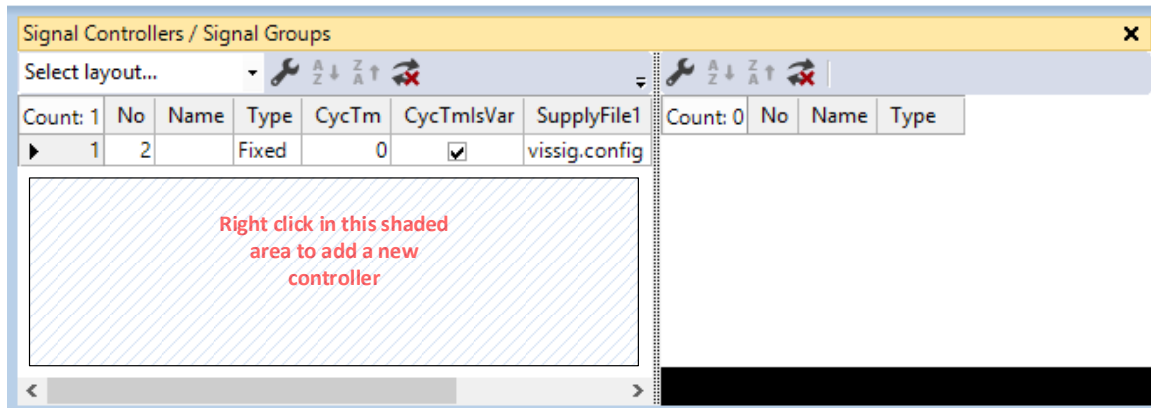


Figure 2. Signal Controller list box

In the Signal Control dialog box,

- Select the "Ring Barrier Controller" controller type from the pull-down menu for Type, noted with the circled "1".
- From the "Ring Barrier Controller" tab, noted with the circled "2", select "Edit Signal Groups", noted with the circled "3".

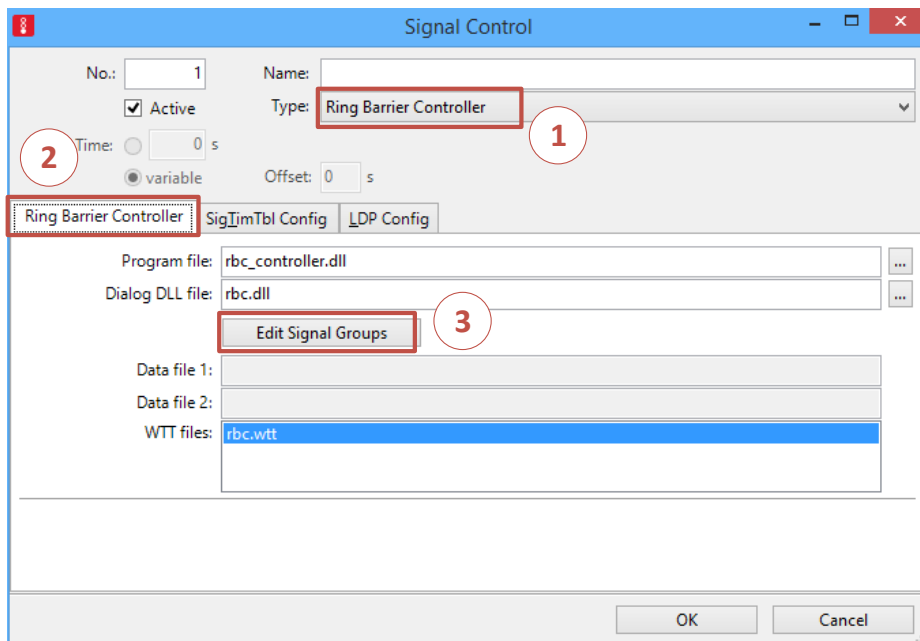


Figure 3. Signal Control dialog box

The Ring Barrier Controller timing parameter screen is shown below.

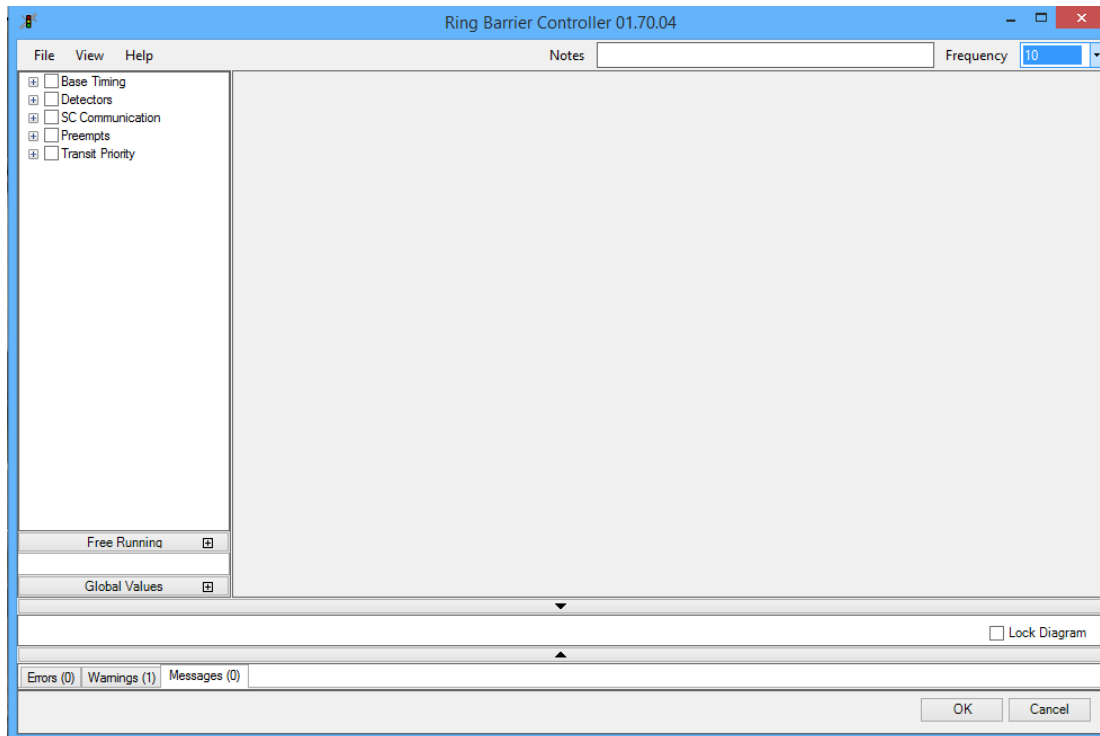


Figure 4 Timing parameter screen for ring barrier controller

Enter the “Base” signal timing data.

- Click on the “plus” by “Base Timing”, then the “plus” by “Timing by SG”, then the “plus” by “Basic”. Check only the boxes as shown below: SG Number, SG Name, Min Green, Vehicle Extension, Max 1, Yellow, Red Clearance, Start Up, and Dual Entry.
- Enter a Signal Group (SG) (Phase) number for each phase that will be provided for your intersection. The SG (Phase) number corresponds to the first digit of the numbering scheme that you developed in Task 1 (Figure 1).
- Enter the “name” that describes the directional movement that is controlled by that phase (for example: “NBL”).
- Enter the timing data for the minimum green time, the vehicle extension time, the maximum green time, the yellow time, and the red clearance time.
- The startup phases should be those that control the major street through movements (usually phases 2 and 6).
- Dual entry¹ should be selected at least for the major street through movements, and possibly for the minor street through movements.

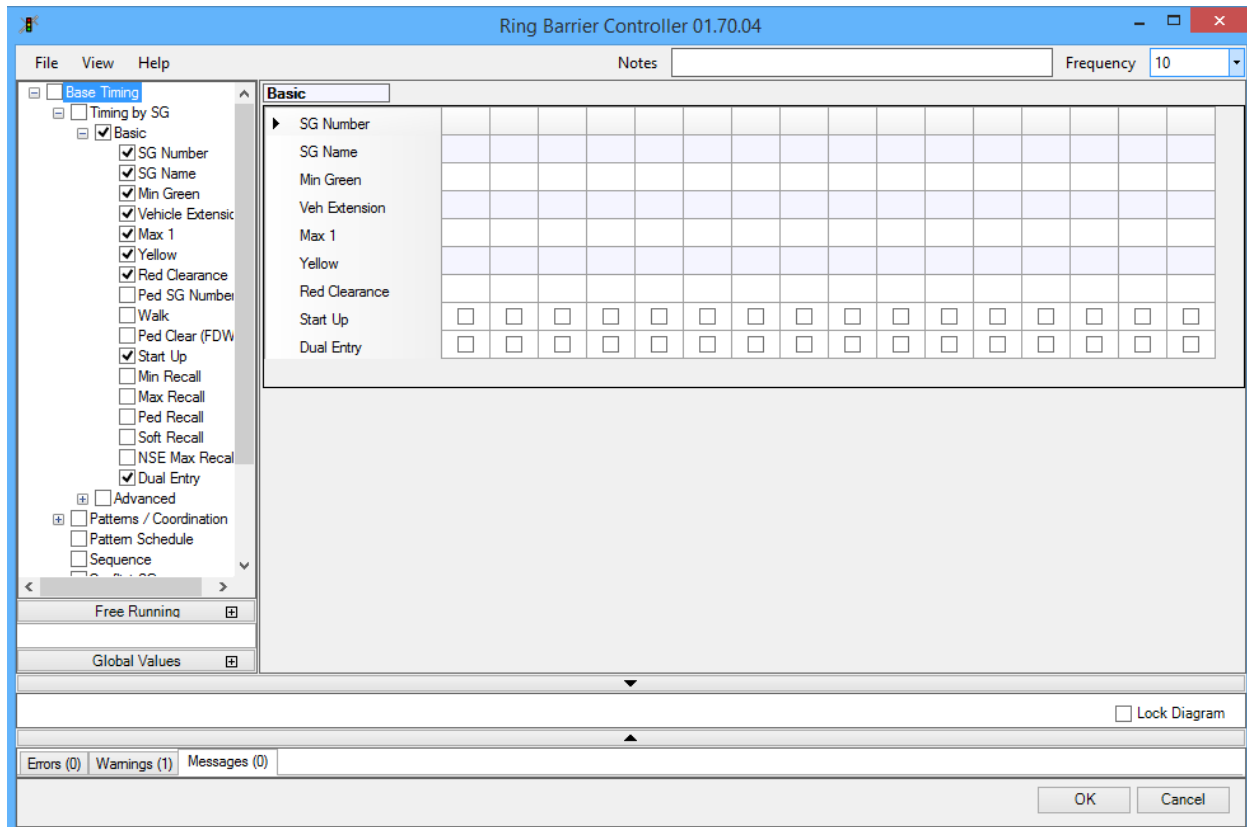


Figure 5. Base signal timing data

¹ “The dual (double) entry parameter is used to call vehicle phases that can time concurrently even if only one of the phases is receiving an active call. For example, if dual entry is active for Phases 2 and 6 and Phase 1 receives a call but no call is placed on Phase 6, Phase 6 would still be displayed along with Phase 1. The most common use of dual entry is to activate the parameter for compatible through movements.” [Source: TSTM]

Next, select the sequence box. Enter the phases that will operate in each ring. Figure 6 shows how to add the barriers to the sequence data.

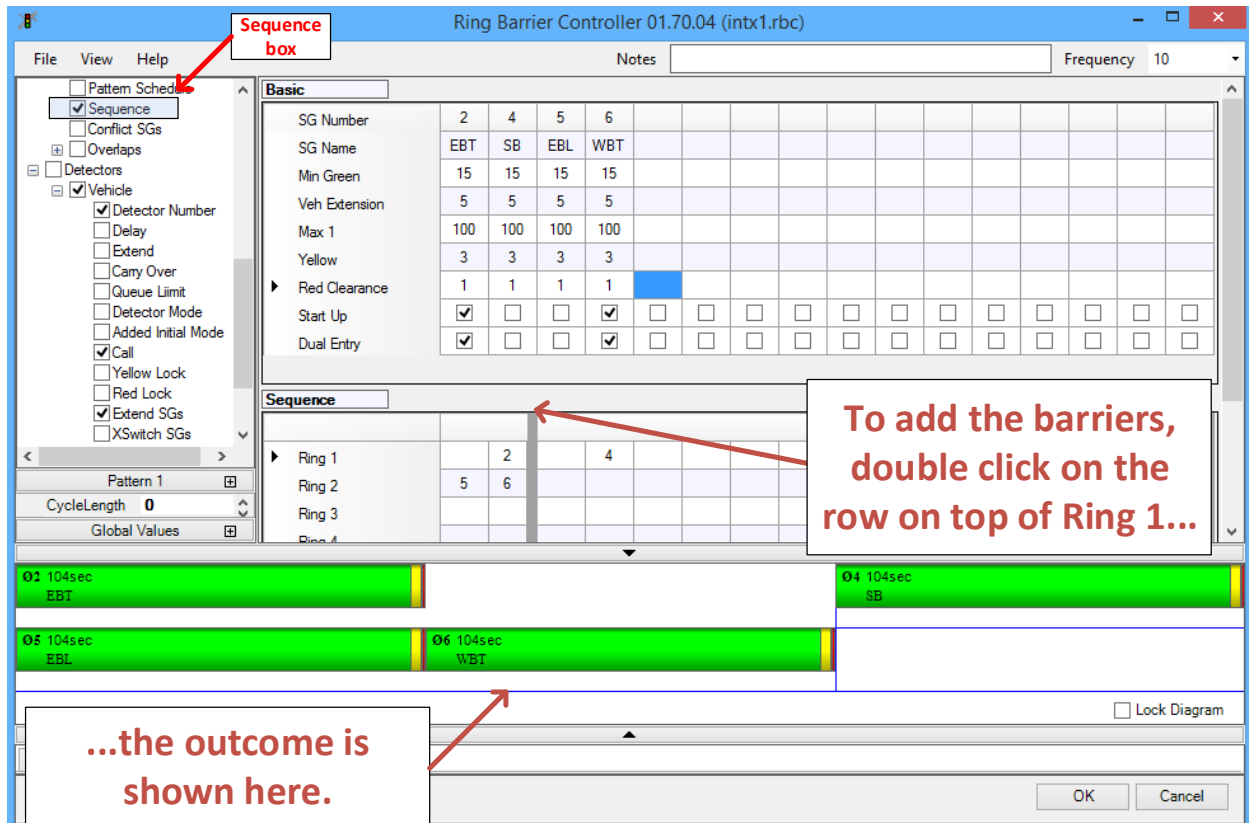
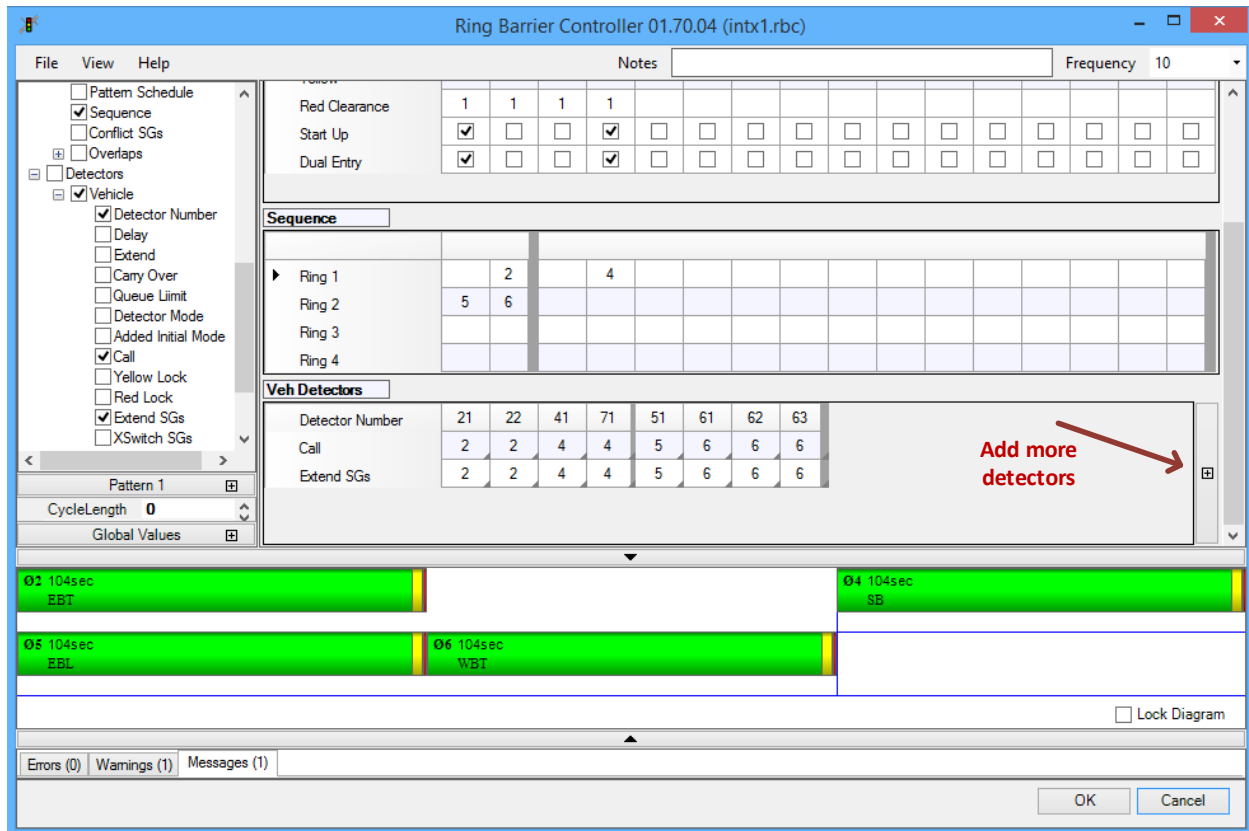


Figure 6. Phase sequencing and barriers

Click the “plus” on Detectors and the “plus” on “Vehicles.” Check Detector Number (that corresponds to the numbers on the sketch that you created earlier), Call, and Extend SG (both of which should correspond to the phase or SG number).

Important:

- Make sure that “Frequency”, in the upper right corner of the figure below, is set to “10.”
- If you need to add more than eight detectors, click on the “plus” on the right edge of the vehicle detectors area, highlighted with a blue box in Figure 7.



Sff

Figure 7. Detector data

After entering the detector information, click OK and save the ring barrier controller data in the folder with your input file. This may take some time so be patient! After the controller data have been saved, the signal control box will open again. Click OK to complete this step and return to the VISSIM interface.

Step 3. Create Signal Heads

A signal head is the actual device showing the display status of the associated signal group (phase). Signal heads are coded in VISSIM for each travel lane individually at the location of the signal stop line. Vehicles wait approximately 0.5m behind a signal head/stop line that displays red. Vehicles approaching an amber signal will proceed through the intersection if they cannot come to a safe stop in front of the stop line.

- Select "Signal heads" from the network objects list.
- Select the location of a signal head for each lane by clicking the link and then right clicking the location where the signal head should be.
- Set the number equal to the detector number from the sketch that you prepared earlier.
- Set the signal group equal to the phase number.
- Select either "left turn arrow" or "circular" for each signal head.

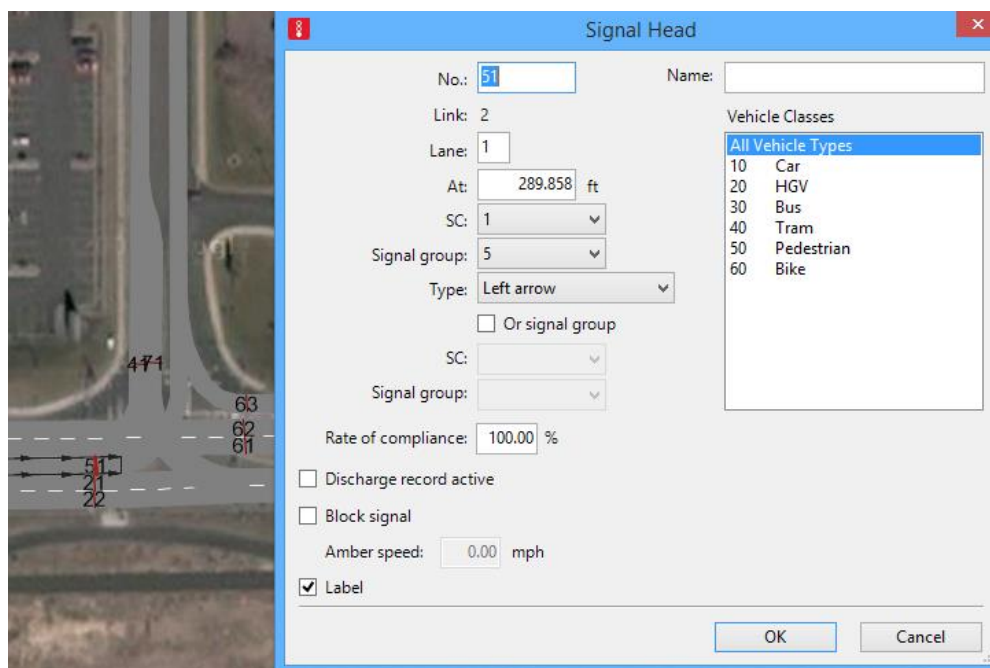


Figure 8. Signal head screen

Notes:

- If you "mouse over" "Signal Heads" in the network objects list, an "A" with a line through it appears. If you click the "A", the line disappears and the signal head numbers become visible on the signal heads.
- If vehicles seem to be ignoring the signal, move the signal head back upstream a small amount. The signal head should be on the link and not the connector.
- It may help to select "Ctrl+a" when adding signal heads. This switches views where links are shown in purple and connectors are shown in pink. You can then place signal heads as close to the connector as possible but still on the link.

Step 4. Add Detectors

“Real life vehicle/pedestrian detection is achieved using various methodologies including induction loops, video cameras, push buttons, track circuits etc. VISSIM models each detector type in the same way: a network element of user-definable length. A message impulse is transmitted to the signal controller as soon as a vehicle reaches this element with its front and another one when it leaves it with its tail. This information is then interpreted by the signal control logic.”

- Select "Detectors" from the network objects list:
- Select the location of the detector for each link by clicking the link and then right clicking the location where the detector should be. The detector should be located just upstream from the signal head.
- Set the length to 22 feet.
- Set the detector number according to your sketch.
- Select “presence” as the detector type.

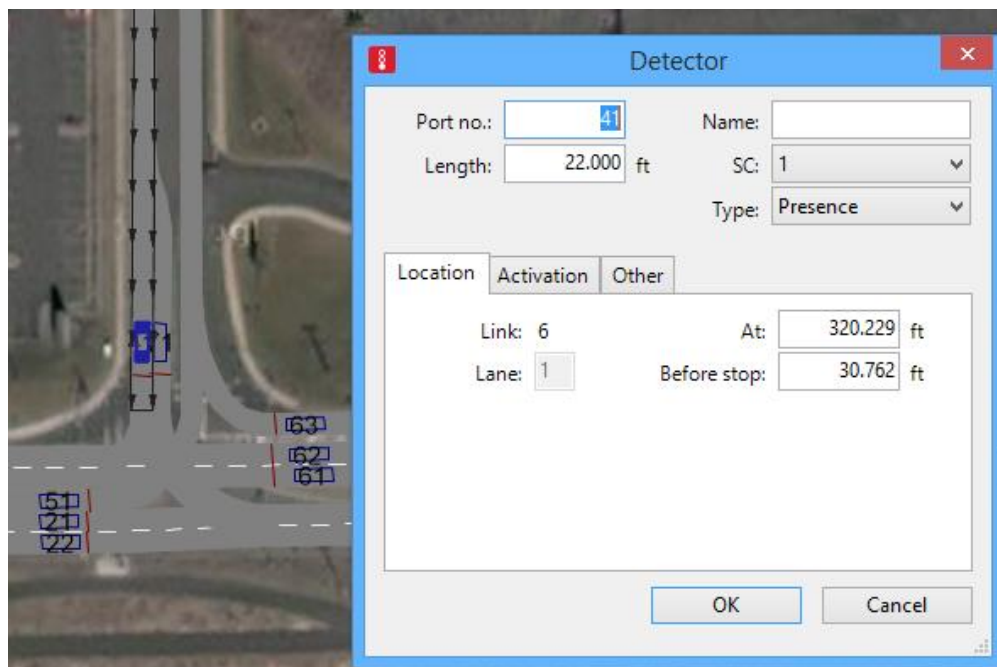


Figure 9. Detector screen

Tutorial #2: Setting Simulation Parameters

Tutorial #2: Setting Simulation Parameters

Parameters for the simulation are set in the “Simulation Parameters” window that is accessible by selecting “Simulation”, then “Parameters.”

Set the following values in the Simulation Parameters dialog box:

- Simulation period is 3600 seconds.
- Simulation resolution is 10 time steps per second.
- Simulation speed is 1 to 5 simulation seconds per second for observing and “maximum” when you are not directly observing the simulation but only collecting data. Note also when you are just collecting data, you can select “control + Q”; this hides the animation, greatly speeding up the simulation.

Simulation Parameters

Comment:

Period: Simulation seconds

Start Time: [hh:mm:ss]

Start Date: [DD.MM.YYYY]

Simulation resolution: Time step(s) / Sim. sec.

Random Seed:

Number of runs:

Random seed increment:

Dynamic assignment volume increment: %

Simulation speed: Sim. sec. / s
 maximum
 Retrospective synchronization

Break at: Simulation seconds

Number of cores:

OK Cancel

Figure 10. Simulation parameters

Tutorial #3: Evaluation Outputs

There are a variety of output data that you can collect. For this activity, you will collect the following data:

- Queue length
- Delay
- Green phase duration

The data are stored in text files or shown in list boxes. The text files can be imported into Excel for easier analysis.

- Node data, which includes number of vehicles, queue length, and delay, are displayed in the Node Results list box.
- Green time distribution data are stored in a text file with a .lzv extension

Select Evaluation, then Configuration. In the dialog box (shown below), select Nodes, and set the “from time”, the “to time”, and the “interval.”

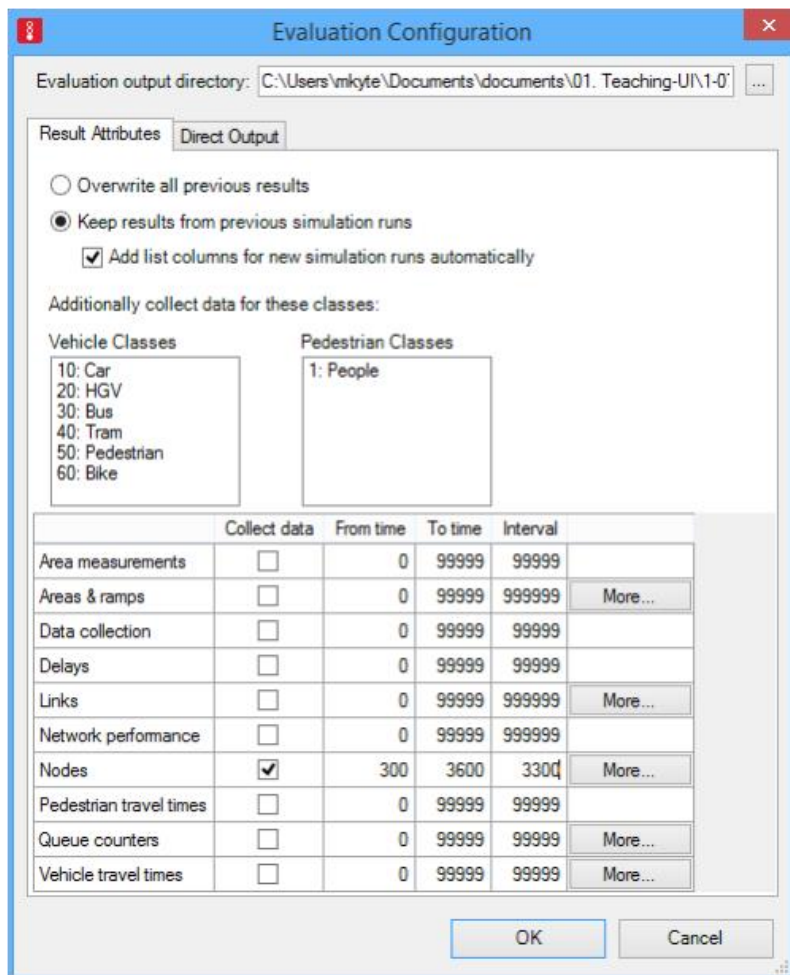


Figure 11. Evaluation Configuration, Result Attributes

Tutorial #3: Evaluation Outputs

On the “Direct Output” tab, select “Green time distribution” and check the “Write to file” box.

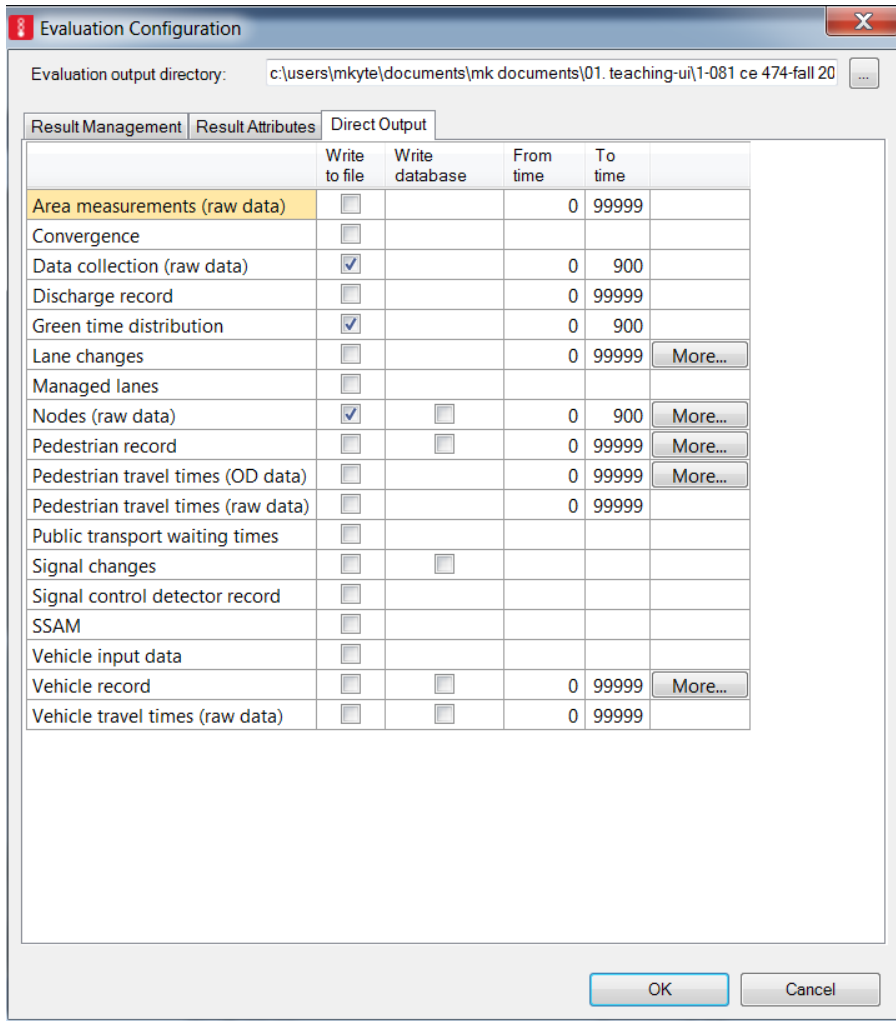


Figure 12. Evaluation Configuration, Direct Output

When you run the simulation, you can view the Node Results list box which shows the queue length (QLen), the number of vehicles (Vehs-All), and the average delay (VehDelay-All) for each link or movement.

Count	SimRun	TimeInt	Movement	QLen	Vehs(All)	VehDelay(All)
1	1	300-900	1 - 1: SH8 E	26.70 ft	206	9.45 s
2	1	300-900	1 - 2: SH8 E	128.80 ft	65	63.10 s
3	1	300-900	1 - 4: SH8	81.23 ft	173	27.22 s
4	1	300-900	1 - 5: SH8	25.14 ft	32	26.44 s
5	1	300-900	1 - 6: Warb	85.74 ft	19	58.80 s
6	1	300-900	1 - 6: Warb	85.74 ft	15	40.99 s
7	1	300-900	1 - 7: Warb	67.35 ft	29	52.87 s

Figure 13. Node results list box

The distribution of green times is available in the .lzv file. The mean green times for each phase (signal group) is shown in the figure below.

```

SC 1, Average Green Times:
Signal group;      t;
      2;          91.7;
      4;          32.2;
      5;          26.0;
      6;          67.3;
    
```

Figure 14. Green time distribution data

Tutorial #4: Changing Input Volumes

- Select the “vehicle input” icon on the toolbar on the left side of the VISSIM screen. Below, the figure shows the vehicle input icon boxed with a red border.
- Double-click on the blue line at the entry point to the link on which you want to change the volumes.
- Enter the desired volume in the table. Figure 15 shows the volume cell boxed with a red border.

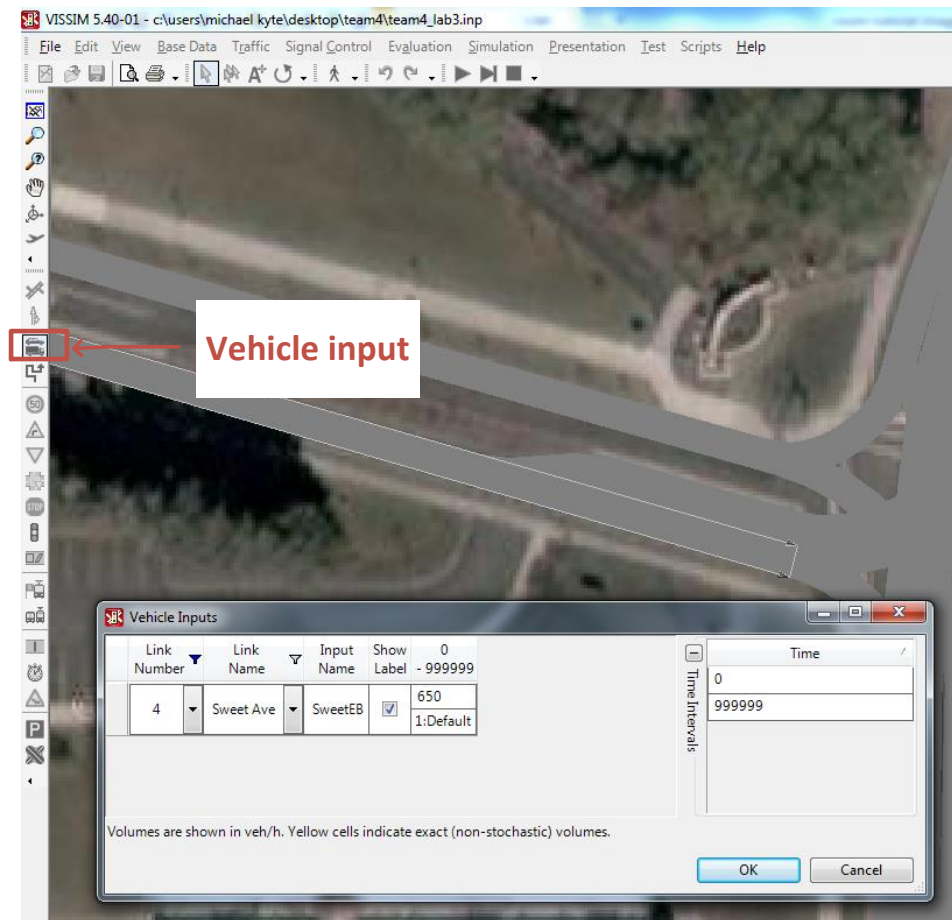


Figure 15. Changing vehicle volumes

Tutorial #5: Setting left turn and right turn traffic volumes to zero

- Select the “routes” icon on the toolbar on the left side of the VISSIM screen. Figure 16 shows the routes icon boxed with a red border.
- Double-click on the red line which is located in the through lane upstream of the signal.
- Set the values of the fifth column to zero for the left turn and right turn movements. To double check which route is being changed, the VISSIM adds a yellow line on the network showing the path of the selected route.

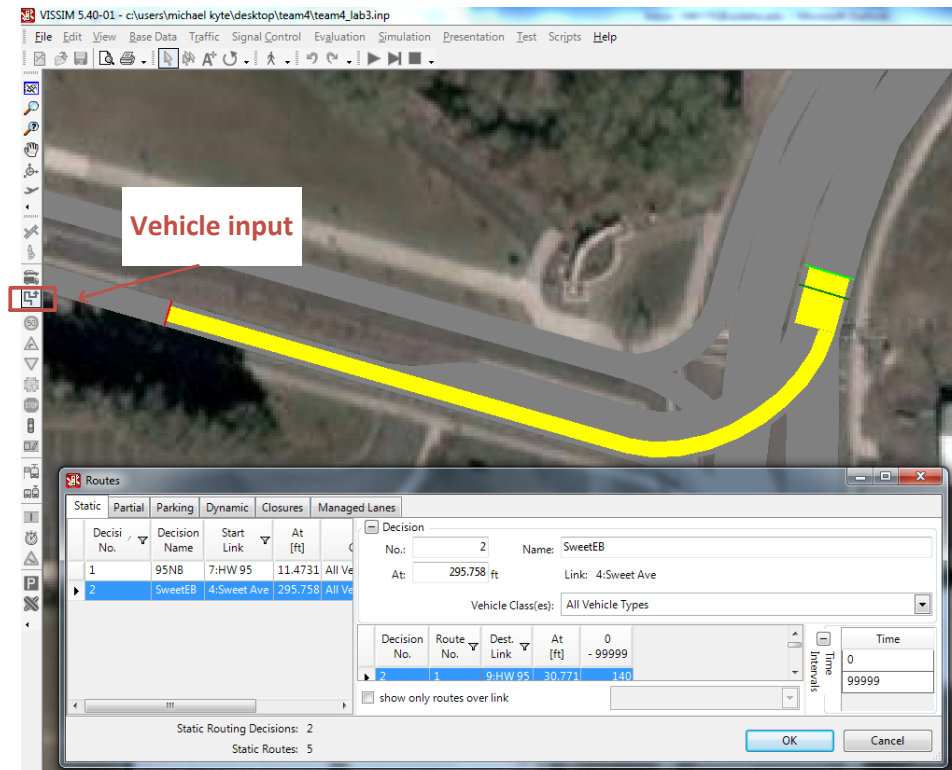


Figure 16. Vehicle volume changes

Tutorial #6: How to Set up Permitted Left Turn Phasing

- Change the LT signal head “type” to “circular”.
- Change the signal head “group” to the same number as the corresponding TH movement.
- In the RBC controller, delete the LT phase numbers and data.
- Set up “priority rules” for the LT permitted movement (see figures below):
 - Select the “priority rules” icon (yield sign) from the toolbar on the left.
 - Select the left turn connector for the LT movement of interest.
 - Place the stop location for the LT vehicle (near the beginning of the connector), using the right mouse button.
 - Select the conflicting TH link connector. Place the “conflict point” using the right mouse button. In the “priority rule” dialog box, set the minimum headway to 200 feet. Select “OK.”

Also, for all intersections, permitted left turns will not work properly unless the detectors of the left turning movements are paired with the according through movement. For instance, when completing this activity for network 5 (PRD and US 95) the EB and WB left turning lanes were backing up into the through movement lanes because detection for these movements were not being considered with the through movements. To fix this, you must go into the controller and change the vehicle detector call designation for each left turn movement to match the through movement.

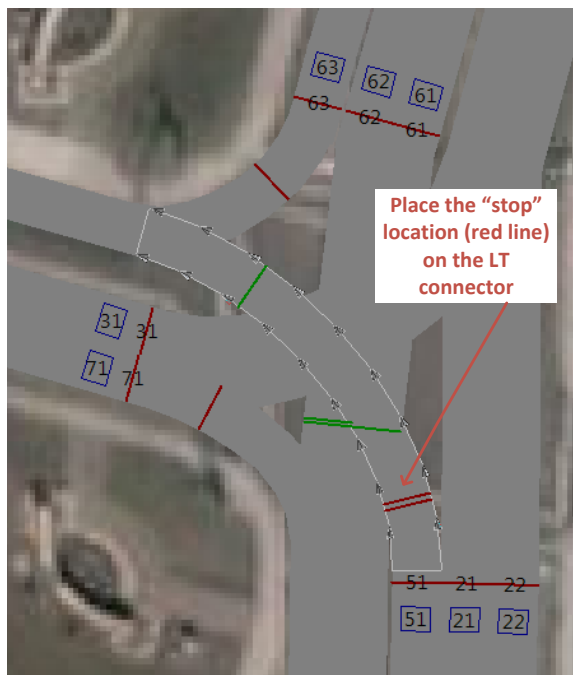


Figure 17. Permitted LTs