

Vissim

(Version 11)

Module 2: Actuated Signal

Georgia Institute of Technology

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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.

PTV-Vissim (V11) Module Overview

This is the second in a series of Vissim modules. This module will familiarize the users with basic actuated control set up. The first module guides the user through the creation of a corridor which consists of three signalized, fixed-time, four-approach intersections. It is highly recommended that a user complete [Module 1](#) prior to undertaking this module. Should a user already have sufficient base knowledge of PTV-Vissim an .inpx file for the completed [Module 1](#) may be used as the starting .inpx file for this module.

This module will step through seven primary tasks:

1. Saving a Vissim file under a new name and renaming controller files.
2. Placing stopbar detectors.
3. Setting RBC control parameters for stop bar detection.
4. Placing upstream detection.
5. Setting RBC parameters for upstream detection.
6. Implementing Coordination.
7. Reviewing controller operations.

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
- Signal Controllers
- Signal Groups
- Ring Barrier Control

Information on these features may be found in [Module 1](#).

IMPORTANT: SAVE FREQUENTLY AS YOU WORK!

Open Module 1 Vissim File

As a first step, we will open the **Module 1** Vissim .inpx as this module builds on the simulation constructed in **Module 1**.

- 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 1** file and left-click on it. (The file will be wherever you saved it when you completed **Module 1**.)

(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 1** you should have the network backbone seen in Figure 1.

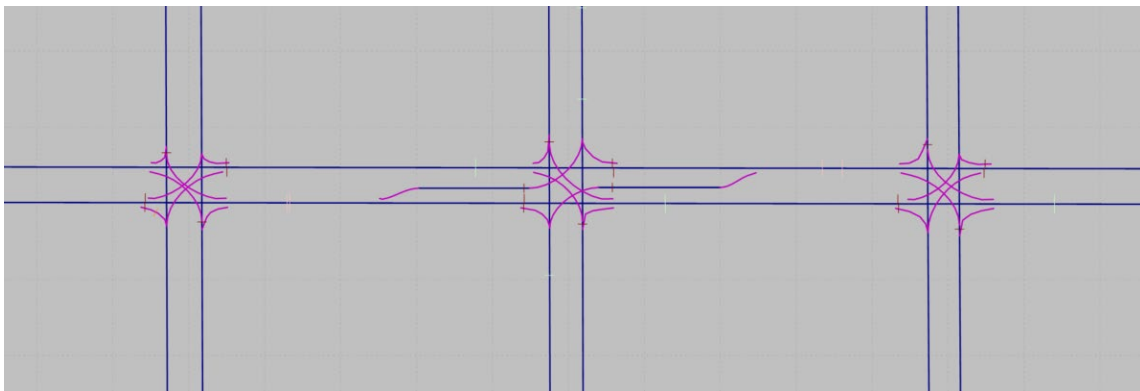


Figure 1: Existing Network Layout

For actuated control, *Ring Barrier Control (RBC)*, which uses a dual ring setup, will be utilized. For **Module 2**, *Signal Groups (SGs)* for each movement will be defined as in Figure 2.

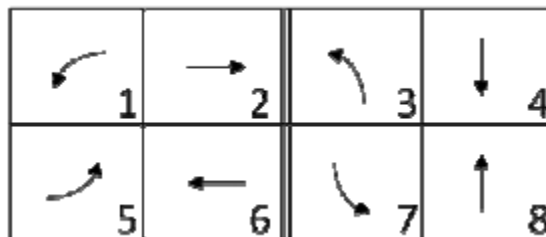


Figure 2: Ring Barrier Control (RBC) Signal Group (SG) Numbering

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 1** 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 2*.
- 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

When you completed **Module 1** 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 name 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 2** network you would ALSO BE CHANGING THE FILES USED BY THE **MODULE 1** SIMULATION FILE. If you then ran the **Module 1** file it would use the updated *RBC*s. **Module 1** presents some of the reasons for this file linking behavior in Vissim. Regardless, it is critical that you also save updated versions of the *RBC* files and link to those in the **Module 2** network. This will be shown next section.

Renaming Signal Controllers

We will create copies of the signal controllers from **Module 1**.

- step i. From the menu bar select *Signal Control* then select *Signal Controllers*. The *Signal Controllers* window will pop up at the bottom of the screen.
- step ii. In the *Signal Controllers* window, left-click on the “1” in the first row. This should be the Buzz Blvd and Burdell Dr., No 111.

The *Signal Controller* pop-up window will open (Figure 3). You should see the intersection *No*: (this was defined in **Module 1** as 111, for the Buzz Blvd and Burdell Dr. intersection), controller *Name*, and *Type* (should be set to *Ring Barrier Controller*). In the *Controller configuration* window, in the *Data file*

entry, you will see the name of the RBC file currently being used. In [Module 1](#) this was set to *RBC_Mod1_Buzz_and_Burdell_v1.rbc*.

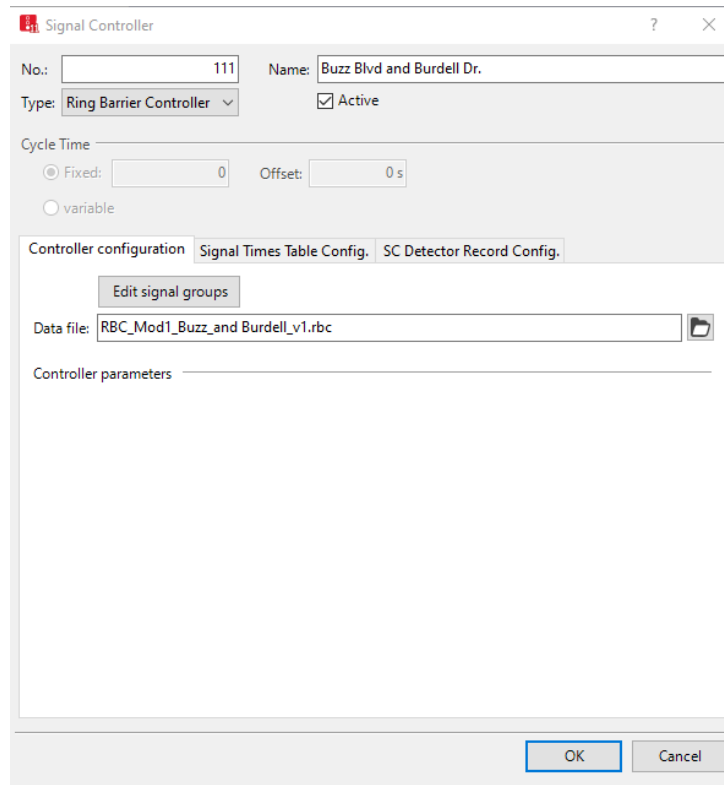


Figure 3: Signal Controller Pop-up Window

- step iii. Left-click Edit Signal Groups. The RBC pop-up window for the current controller (RBC111.rbc) opens.
- step iv. Left-click the File pull down menu.
- step v. Left-click Save File as.
- step vi. Enter a new file name in File name, use: *RBC_Mod2_Buzz_and_Burdell_v1*.
- step vii. Left-click Save in the pop-up window.
- step viii. Left-click OK in the RBC pop-up window.

In the Signal Controller window, you should now see *RBC_Mod2_Buzz_and_Burdell_v1* in Data file. This is the file that will now be used for your [Module 2](#) network.

- step ix. Left-click OK in the Signal Controller pop-up window.

Repeat this procedure for the remaining two intersections. If you followed the naming conventions of [Module 1](#) you will update *RBC_Mod1_Buzz_and_Ramblin_v1.rbc* to *RBC_Mod2_Buzz_and_Ramblin_v1.rbc* and *RBC_Mod1_Buzz_and_Pi_v1.rbc* to *RBC_Mod2_Buzz_and_Pi_v1.rbc*.

Helpful Hint

When to Update RBC Filenames

You could wait to save the *RBC* files to new file names until you edit the timings, as you will need to repeat some of the same steps. However, it is good practice to update the *RBC* files at the same time you save to a new *.inpx* file to avoid forgetting this needs to be done.

Tracking RBC Filenames


You may find at times it is efficient to use the same *.rbc* file in several Vissim models, for instance, multiple “build” scenarios. This is one of the strengths of *RBC* files separate from the *.inpx* file. However, be sure you maintain detailed tracking of which *.inpx* uses each *RBC* file to avoid making changes in one model that you did not intend to be applied to another model.

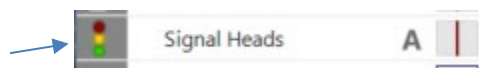
Adding Stop Bar Detection

The next step is to add the stop bar detectors. However, for quick review, we will first check to make sure the *Signal Groups (SG)* and *Signal Heads (SH)* and are correct, as defined in Module 1.

Check Signal Groups and Signal Heads

To quickly view the signal group assigned to each signal head, follow the below steps:

- step i. Toggle from the wireframe to the base view by left-clicking the *Toggle Wireframe* button (). (You don't have to do this step, but it will be a little easier to read the *SG* values with the *links* and *connectors* not displayed.)
- step ii. Check that the *SHs* are visible. You toggle on and off the *SH* graphics by left-clicking on the left-side of the *Signal Heads* icon on the *Network Objects* menu. (This is how you change the visibility of any of *the Network Objects*)



- step iii. To display the *SG* numbers left-click on the right-side of the *Signal Head* icon in the *Network Objects* menu.



- step iv. In the pop-up window (Figure 4) select *Label Attributes*. (You need to click the “...” to the right.)

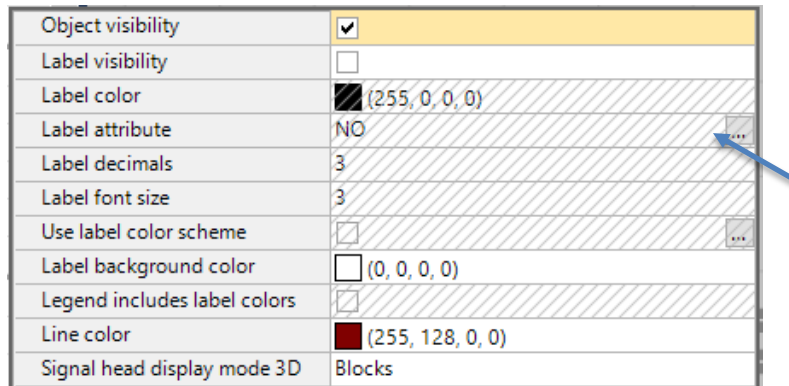


Figure 4: Signal Heads Graphic Parameters Pop Up Window

step v. Select *Signal Groups* in the *Label Attributes* pop-up window.

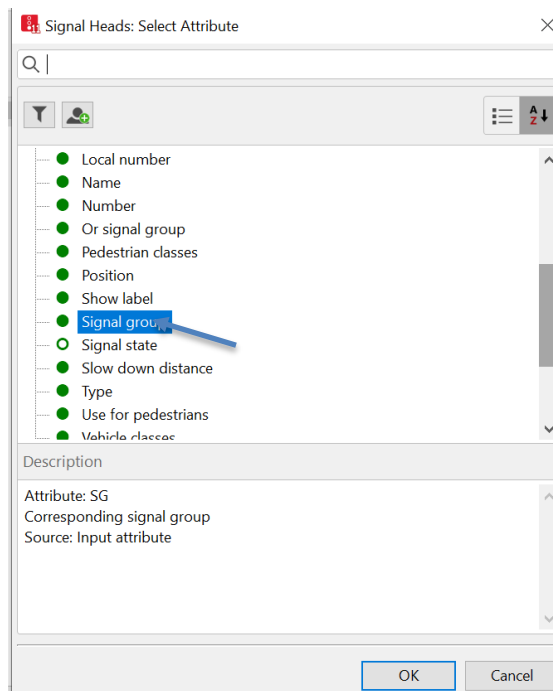


Figure 5: Signal Heads: Select Attribute Pop Up Window

step vi. Left-click *OK*.

step vii. The *Signal Heads* network objects pop-up should still be open (if it is not left-click the bar icon as in step iii). Check the *Label Visible* box. You may also find it helpful to increase the *Label Font Size*.

step viii. Left-click on the *Vissim Network Editor*. Size the map so you can see the Buzz Blvd and Burdell Dr. intersection. You should see the *SG* associated with the *SHs* as in Figure 6 below. If the *SGs* are not correct go to the *Signal Heads* discussion in **Module 1** and update the signal heads.

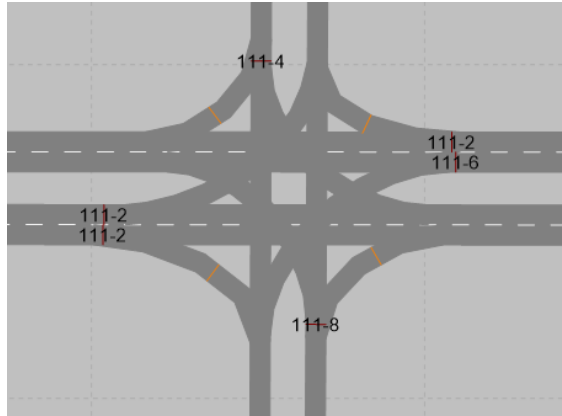


Figure 6: Buzz Blvd and Burdell Dr. intersection SG and Signal Head Association.

- step ix. Size the map so you can see the Buzz Blvd and Ramblin St. intersection. You should see the *SGs* associated with the *SHs* as in Figure 7 below. If the *SGs* are not correct go to the *Signal Heads* discussion in [Module 1](#) and update the signal heads.

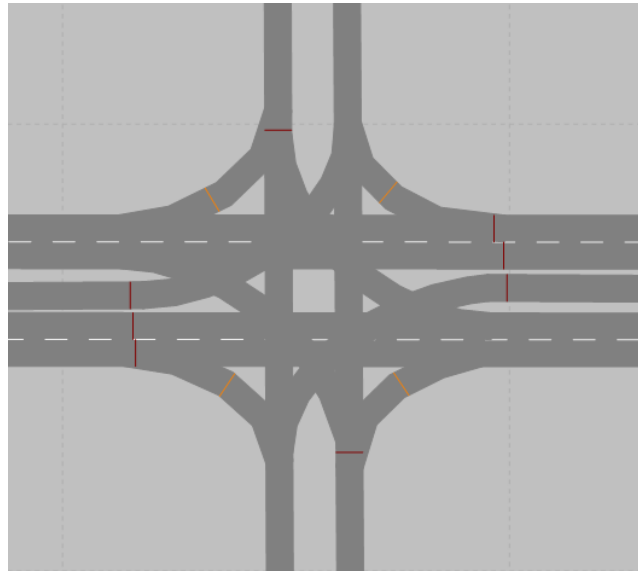


Figure 7: Buzz Blvd and Ramblin St. intersection SG and Signal Head Association

- step x. Size the map so you can see the Buzz Blvd and Pi Pkwy. intersection. You should see the *SGs* associated with the *SHs* as in Figure 6 above (same figure as the Buzz Blvd and Burdell Dr. intersection, with the intersection number as 333). If the *SG* are not correct, go to the *Signal Heads* discussion in [Module 1](#) and update the signal heads.

Stop Bar Detectors

To place the detectors it is helpful to be in base view. If you are in *wireframe* toggle to base view as discussed above. Also, if the *SG* numbers are still showing on the map it may be helpful to turn those off for now (uncheck *Labels Visible* box as above).

- step i. Left-click the *Detectors* icon in Network Objects.
- step ii. Left-click on the South Bound *Link* of the Buzz Blvd and Burdell Dr. intersection.
- step iii. Right-click on the southbound link approach in the approximate location of the signal head. (You will fine-tune this location later. Also, be sure the detector is placed on the SB link, if the right or left turn connector highlights when you place the link you will have placed the detector on that connector.)
- step iv. The Detector pop-up box should now be displayed, Figure 8. (If a pop-up list appears Left-click *Add New Detector*. This means you have your user preference for a right-click set to *open the context menu*. I prefer to set the right click preference to *creates new object*. See Module 1 for more detail.)
 - a. Set the *Port no.:* to the number you used when defining the *SG* in the *Signal Controller*. In this case, we used the *SG* or phase number, i.e., 4.
 - b. Set the *Length* to 40ft.
 - c. Be sure the *SC* is set to 111, i.e. the controller for the Buzz Blvd and Burdell Dr. intersection.
 - d. The *Link* and *Lane* numbers should be set automatically.
 - e. Set the detector *Name* “Buzz and Burdell SB”.
 - f. Set the *Before Stop* value equal to the length of the detector, this will set the detector starting at the *Signal Head*. (The *At* value is the position of the detector measured from the start of the link, this will automatically recalculate when you press OK. Your *At* value may also be a little different from that in Figure 8 depending on how you drew the network. You may need to close and open the *Detector* window before you can set the *Before Stop* value.)

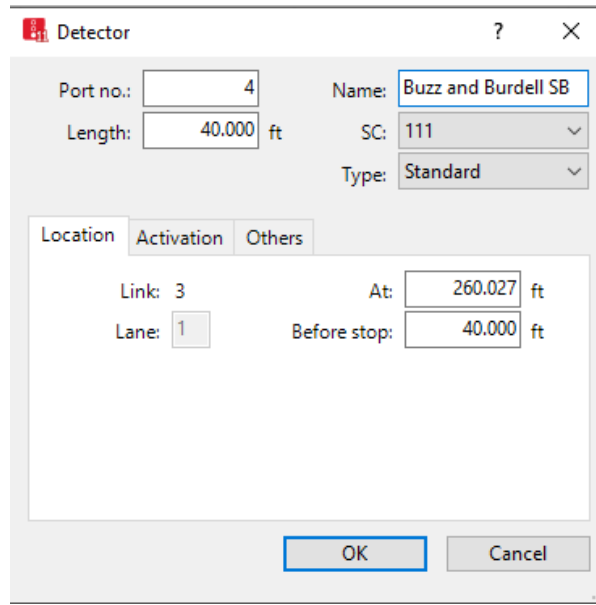


Figure 8: Buzz Blvd and Burdell Dr. Intersection SB Detector Pop-up Window

step v. Left-click *OK* in the *Detector* Pop-up box. The intersection with the detector should look like Figure 9.

(If the detector did not place correctly left-click on the *detector* and drag it so the front just about touches the stop bar. You can further fine-tune the location by double left-clicking on the detector, which will open the *Detector* pop-up window.)

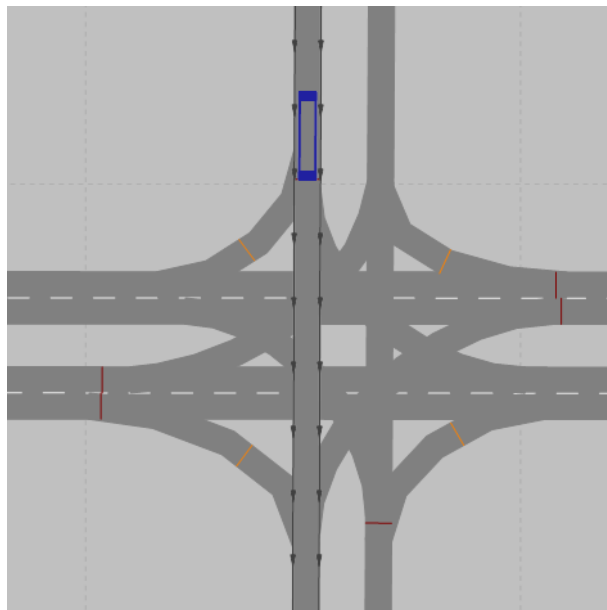


Figure 9: Buzz Blvd and Burdell Dr. Intersection SB Detector Placement

step vi. Repeat steps ii through vi for the northbound approach. In this case, the *Port no.* will be 8. Figure 10 shows the *Detector* pop-up window and detector placement.

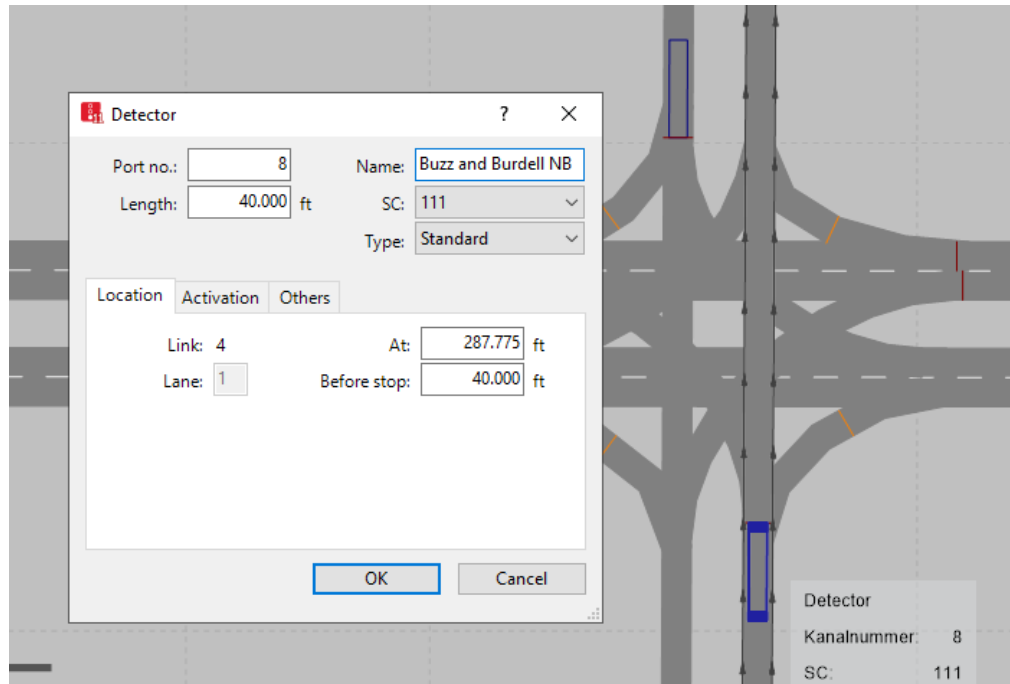


Figure 10: Buzz Blvd and Burdell St. Intersection NB Detector Pop-Up Window and Detector Placement

Repeat the process for the intersections of Buzz Blvd and Ramblin St., and Buzz Blvd with Pi Pkwy. Be sure to update the SC number to 222 or 333, as appropriate, as the default is always the first intersection in the intersection list. (If you don't the detections on these detectors will place calls on the Buzz Blvd and Burdell St. intersection!) Don't forget to also include the left turns for the center intersection. An example of the EB left *Detector* dialogue box and the detector placement is shown for the center intersection in Figure 11.

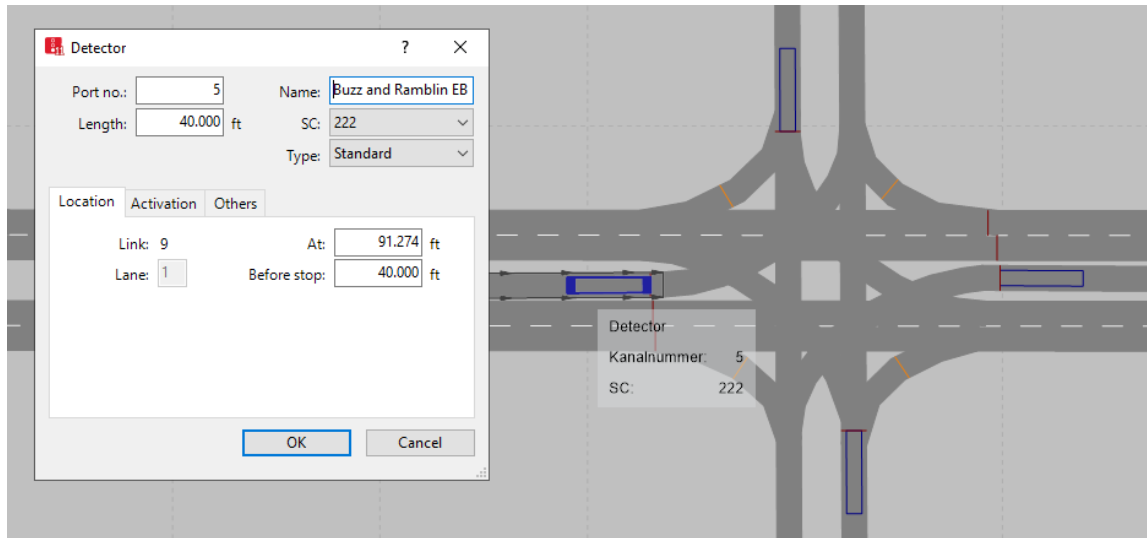


Figure 11: Buzz Blvd and Ramblin St. Intersection EB Left Detector Pop-Up Window and Intersection Detector Placements

(This would be a good time to save your model!)

At this point, we have a model with actuation on the side streets and left turns. In Vissim 11 if you hover your mouse icon over a detector you should see the assigned *Port No.* and *SC* number.

This is a good point to do a test run of the model and see how it works. Go ahead and run the model (as described in [Module 1](#)). Check to see if you see any obvious issues. The detectors are not yet influencing the signal timing (that is next!) but it is helpful to run the model often as you develop it, this will help you catch errors as you go.

CRITICAL CONCEPT

Watch the model animation looking for any issues. Prior to doing any analysis or reviewing the simulation output, a review of the animation is one of the most powerful ways to verify that the model is behaving appropriately and catch many errors.

Helpful Hint

A few helpful hints in reviewing model animation:

- Run the model often as you are making changes. Thus, if there is an issue, the number of possible sources is limited to your most recent changes.
- Let the model run for a short period (roughly long enough for a vehicle to traverse the longest route in the model) before detailed checking. Some errors will not become obvious until the model is “full”. (This will be discussed in detail in [Module 7](#).)
- Look at each movement in every intersection, ramp junction, lane drop, etc. Watch each section for a few minutes as not all vehicles will necessarily have the same behavior. Confirm that the vehicle behavior is as expected. For example:
 - Is the order of signal indications correct?
 - Are conflicting signal indications active at the same time?
 - Are vehicle stopping on the red?
 - Are vehicles going on the green?
 - For an actuated signal are indications working as expected?
 - Are vehicle yielding as expected, i.e. left turns yielding to through movements?
 - Is there traffic on all movements?
 - Do the volumes look “roughly” correct? (In the formal model verification, [Module 7](#), we will check the volumes in the simulation output but often you can see gross errors in the animation.)
 - Are vehicles merging as expected?
 - Etc.
- You may find it helpful during the animation review to increase or decrease volumes. Some issues do not become apparent unless under high or low traffic demands. (Just be sure to set them back to the correct volumes!)
- On model startup actuated signals will call all phases in the first cycle, regardless of the presence of a vehicle. Thus, you need to wait until at least one full cycle before checking actuated behavior. (We will set actuated signal parameters in the next section.)
- While the many variations in dual ring control cannot be covered within this module it is important that you become knowledgeable about dual ring control behavior, allowing you to adequately review models with this control type.

RBC Parameters

Next, you will edit the RBC parameters for each intersection. For the intersections of Buzz Blvd with Burdell Dr. and Buzz Blvd with Pi Pkwy, we placed detectors on the side streets, for the intersection of Buzz Blvd with Ramblin St. will also included left turn actuation.

Buzz Blvd and Burdell Dr. Intersection

(Intersection 111, RBC filename: RBC_Mod2_Buzz_ and Burdell_v1.rbc.)

- step i. From the menu bar select *Signal Control*, then select *Signal Controllers*. The *Signal Controllers* menu will pop up at the bottom of the screen.
- step ii. In the *Signal Controllers* menu, left-click on the “1” in the first row for your first intersection. This should be the Buzz Blvd and Burdell Dr. intersection, No 111. (If it is not, select the row that contains this intersection. By default, they are numbered in the order created.)
- step iii. Left-click *Edit Signal Groups*. The RBC pop-up window for the current controller (*RBC1112.rbc*) opens.

The menu tree on the left contains the settings you will use for the actuated controller. Clicking on the + or – expands or collapses different options, and checking and un-checking the boxes will show or hide the settings on the right side. Initially, we are going to set up the three intersections to operate in free-running mode (i.e., not in coordination) with actuation on the side streets.

- step iv. Figure 12 below shows the setup for the *Basic* data in the *RBC* pop up window for Buzz Blvd and Burdell Dr. Populate the open *Edit Signals Group* Window to match Figure 12. Notice, you are making minor (but significant!) changes to the [Module 1](#) timings.
- step v. In the upper right of the RBC pop-up window, you will see *Frequency*. This is the number of times per second Vissim updates the *RBC*. Since we are working with actuated control change the value to 10.
- step vi. Left-click OK in the RBC pop-up window.
- step vii. Left-click OK in the *Signal Controller* pop-up window.

(If you have not been saving often, this would be a good time to save your Vissim work!)

Ring Barrier Controller 01.70.04 (RBC_Mod2_Buzz_and_Burdell_v1.rbc)

File View Help Notes Frequency 10

Base Timing

- Timing by SG
 - Basic
 - Advanced
- Patterns / Coordination
 - Pattern Schedule
 - Sequence
 - Conflict SGs
- Overlaps
- Detectors
 - Vehicle
 - Pedestrian
 - Queue
- SC Communication
- Preempts
- Transit Priority

Pattern 1

CycleLength 0

Global Values

Basic

SG Number	2	4	6	8															
SG Name	EB	SB	WB	NB															
Min Green	10	8	10	8															
Veh Extension	3	3	3	3															
Max 1	60	50	60	50															
Yellow	3	3	3	3															
Red Clearance	2	2	2	2															
Ped SG Number																			
Walk																			
Ped Clear (FDW)																			
Start Up	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Min Recall	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Max Recall	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ped Recall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soft Recall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NSE Max Recall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dual Entry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Veh Detectors

Detector Number	4	8																	
Delay																			
Extend																			
Carry Over																			
Queue Limit																			
Detector Mode	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect	No Disconnect
Added Initial Mode	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Call	4	8																	
Yellow Lock																			
Red Lock																			
Extend SGs	4	8																	

01 65sec EB

04 55sec SB

06 65sec WB

08 55sec NB

Lock Diagram

Errors (0) Warnings (1) Messages (1)

OK Cancel

Figure 12 Buzz Blvd and Burdell Dr. Intersection RBC Settings

Helpful Hints

The Vissim RBC has a number of actuated controller and detectors features. Such as *Dual Entry*, *Soft Recall*, *Detector Delay*, *Detector Extend*, etc. You are encouraged to explore the various features and to test the impact of difference settings (after completing the module!). For now, a fairly simple setting is implemented. Phases 2 & 6 (mainline) are set to *Max Recall*, so their full phase length will be served every cycle. Phases 4 & 8 are set to the *Min Recall*, so the phases will be served every cycle; however, only the minimum green time is guaranteed. Phases 4 & 8 will be extended (vehicle extension time set to 3 seconds) by vehicles driving over the detector. *Start-up* indicates which will be the first phases when the simulation starts.

The *Detector* numbers have been set to the same number as the *Signal Groups* (i.e. phases). This will help in reviewing your model and avoiding mistakes. However, it is recommended that the Vissim model use whatever numbering scheme will be used in the field. This will greatly reduce the likelihood of errors when translating between Vissim and the field data. The *Call* number is which *Signal Group* will be called by the detector.

If you are unsure of actuated signal control operation you are encouraged to review the Traffic Signal Timing Manual (<http://www.signaltiming.com>) which provides a great overview of traffic signal control.

Buzz Blvd and Pi Pkwy Intersection

The Buzz Blvd and Pi Pkwy intersection follows the same updates as the Buzz Blvd and Burdell Dr. intersection. Update the intersection by left-clicking on intersection “333” in the *Signal Controllers* menu at the bottom of the screen. The *Supplyfile1* column in the *Signal Controller* menu shows which RBC files are linked to that controller. Make sure it is the correct one, i.e., *RBC_Mod2_Buzz_and_Pi_v1.rbc*. Implement the steps as given for the intersection of Buzz Blvd and Burdell St.

Buzz Blvd and Ramblin St. Intersection

This intersection will be slightly more complicated than the other intersections as we also need to account for the EB and WB lefts.

- step i. If the *Signal Controllers* menu is not open: from the menu bar select *Signal Control* the select *Signal Controllers*. The *Signal Controllers* menu will pop up at the bottom of the screen.

- step ii. In the *Signal Controllers* menu, left-click on the “2” in the second row for the center intersection. (If it does not, select whichever row has that file.)
- step iii. Left-click *Edit Signal Groups*. The RBC pop-up window for the current controller (*RBC_Mod2_Buzz_and_Ramblin_v1.rbc*) opens.
- step viii. Figure 13 below shows the *RBC* pop-up window. Populate the open *Edit Signals Group* Window to match Figure 13. As with the other intersections, the items we are editing are *Base Timing* → *Timing by SG* → *Basic* and *Detectors* → *Vehicles*.
- step iv. Change the *Frequency* to 10
- step v. Left-click OK in the RBC pop-up window.
- step vi. Left-click OK in the *Signal Controller* pop-up window.

Save, Save, Save, Save.....

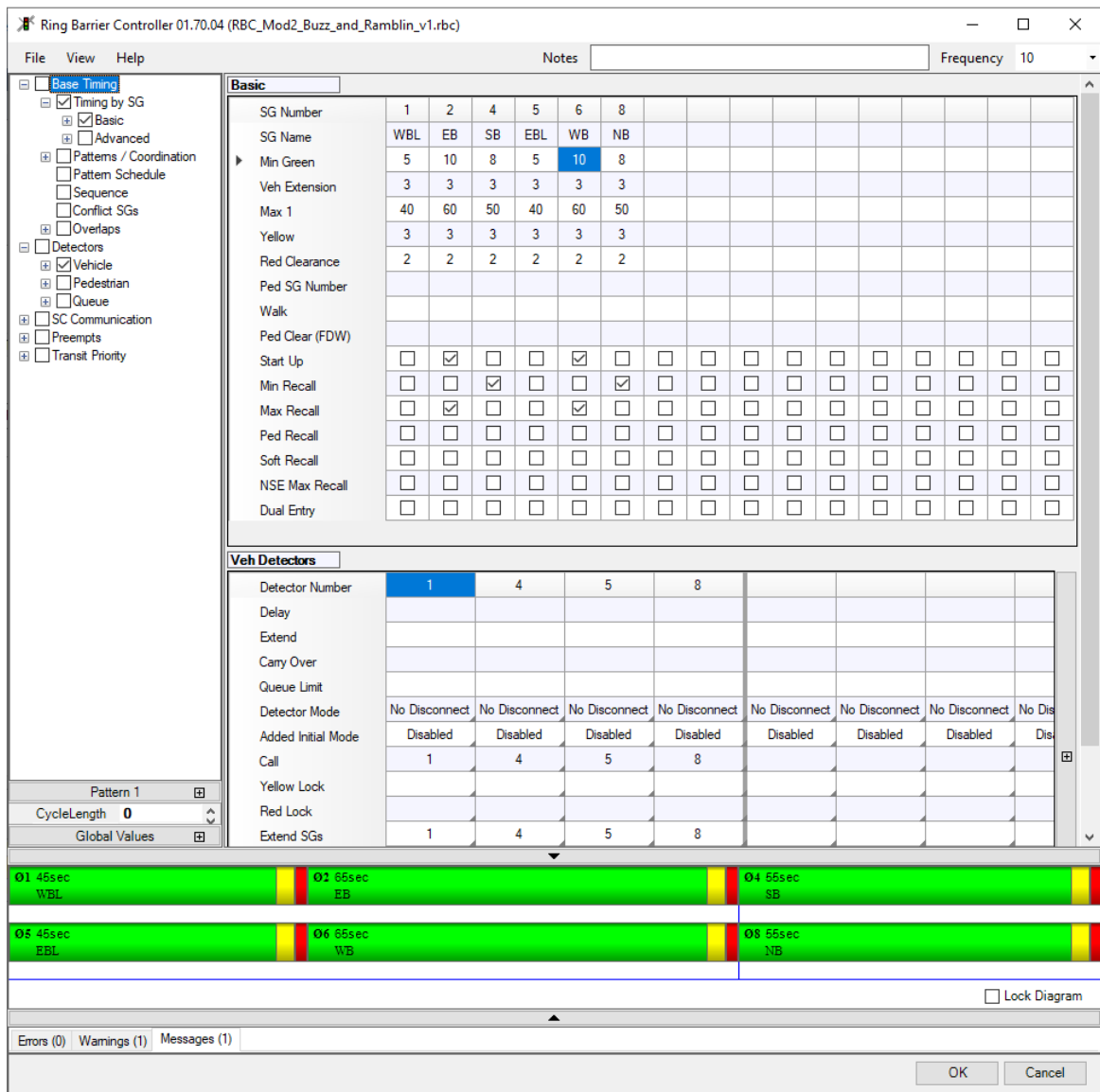


Figure 13 Buzz Blvd and Ramblin St. Intersection RBC Controller Settings

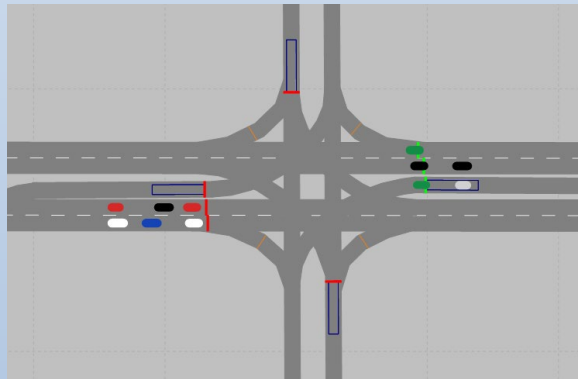
Run the model

- step i. From the simulation pull down menu select continuous (or press the blue arrow).
- step ii. Review the operation of each intersection.

Helpful Hints

A few helpful hints specific to this model include:

- On the Burdell Blvd and Pi Pkwy intersections, the side streets have been set to *min recall*, this means they will turn green regardless of the presence of a vehicle. They will remain green the length of the minimum green and then extend up to the length of maximum green, depending on the demand, i.e. the presence of additional vehicles. Check to make sure this is occurring.
- On all three intersections phases 4 & 8 must “gap out” together. For example, if there are vehicles on the phase 8 approach then phase 4 will hold green even if there are no vehicles on the phase 4 approach. Why? Because if phase 4 gapped out the next phase in the Ring would be phase 1 or 2 (depending on if phase 1 is programmed) which is a conflict with phase 8. Thus, both phase 4 and 8 must cross the dual ring barrier at the same time. (If we had not set phases 4 & 8 to min recall it would be possible for just one approach to turn green while the other stayed red, if it had no vehicles on the detector.)
- For the center intersection you should be able to see instances of phase 1 or phase 5 (or both) being skipped. Since these phases are not on recall they will only be called when there is a vehicle present on the detector. The figure below is an example of only phase 1 receiving a call.



Example Indications for call on Phase 1 and not on Phase 5

- It can be a good idea to raise or lower volumes to test the features. Just be sure you return the volumes to their original settings.
- Use the “-“ and “+” to slow down and speed up the simulation if you are having trouble viewing the animation.

Upstream Detectors

So far, what you have created are semi-actuated intersections, in that not all movements are actuated. Currently the mainline (phases 2 & 6) are set to max-recall, always receiving their full phase length. Let's now include detection upstream of the stop bar on Phases 2 & 6, creating fully actuated signals. (You could also use stop bar detection but this will let you practice different detector locations).

As before, to place the detectors it is helpful to be in base view. If you are in wireframe toggle to base view as discussed previously.

- step i. Left-click the *Detectors* icon in *Network Objects*.
- step ii. Left-click on the eastbound *Link* of the Buzz Blvd
- step iii. Right-click on the eastbound link approach, outside lane (lane 1), approximately 150ft upstream of the Signal Head, (i.e. stop bar) at the intersection with Burdell Dr. Rough guess is ok, you will fine-tune this location later.
- step iv. The Detector pop-up box should now be displayed.
 - a. Set the *Port no.:* to the detector number you used when defining the *detector* in the *Signal Controller*. This is the *Call* attribute Figure 5. In this case, we used the SG or phase number, i.e., 2.
 - b. Set the *Length* to 6ft.
 - c. Set the Type to *Standard*
 - d. Be sure the *SC* is set to 111, i.e. the controller for this intersection.
 - e. The *Link* and *Lane* numbers should be set automatically but double-check.
 - f. Set the *Before Stop* value equal to the length of the detector plus the distance upstream of the stop bar. In our case let's go 150ft upstream, so set the *Before Stop* to 156 ft.

Figure 14 shows the dialogue box for the westbound link approach, outside lane, and the detector placed on the network.

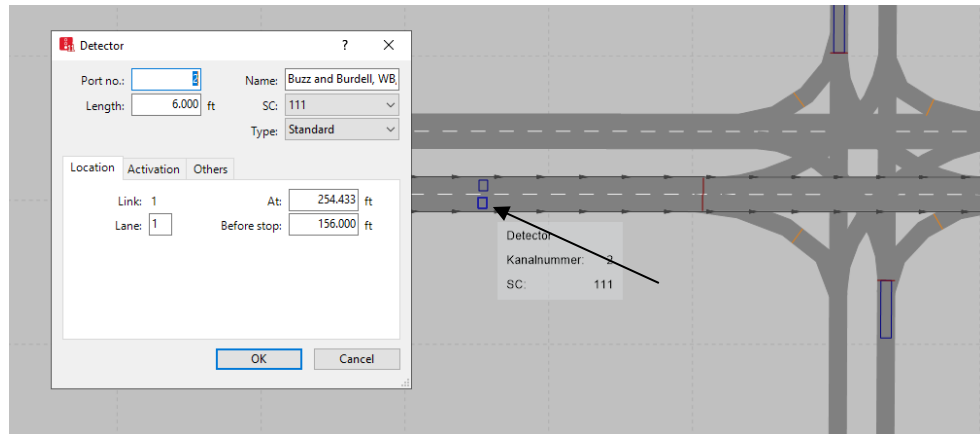


Figure 14: Upstream Detector Placement, Buzz Blvd and Burdell Dr. Intersection, EB link approach

- step v. Left-click *OK*
- step vi. Repeat steps i through vi for the inside lane, i.e. lane two. Be sure that the lane in the Detector pop-up is now Lane 2. Everything else is set as above. (You may receive a message stating that other detectors are assigned to the signal controller and asking if it is ok to apply the values for type and smoothing factors to all detectors in this group. Click *Yes*.)
- step vii. Repeat steps i through iv for the WB lanes of the Buzz Blvd and Burdell Dr. Be sure you are updating the *Link* and *Lane numbers* as well as the *Port no.* to the phase number, which should be 6).

The intersection with complete detection should look similar to Figure 15.

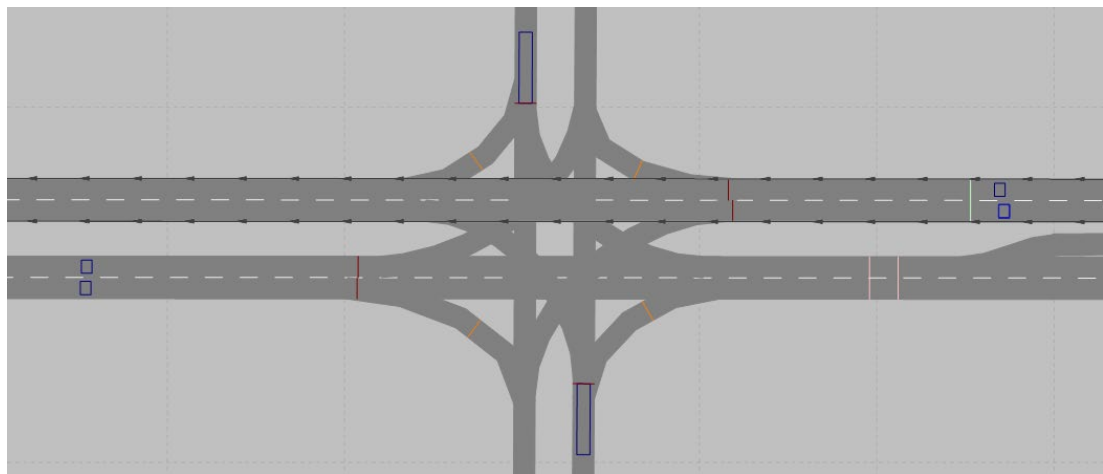


Figure 15: Buzz Blvd and Burdell Dr. Intersection Detector Layout.

step viii. Next, you need to update the signal controller settings. From the *Signal Controllers* menu pull-down select *Signal Controllers*. The *Signal Controllers / Signal Groups* window will now be present at the bottom of the screen. (If you have been working continuously this will already be open. At the very bottom of the screen, you should see tabs for all of the windows that are open. You can select between these without needing to use the top menus.)

step ix. Select Buzz Blvd and Burdell Dr.

step x. Select *Edit Signal Groups*.

step xi. Edit the Ring Barrier Control to reflect Figure 16. (We are changing phases 2 & 6 to min recall, increasing phases 2 & 6 min green, and adding detectors.)

step xii. Left-click *OK*

step xiii. Left-click *OK* in the *Signal Controller* pop up window

Aside: There are a number of ways you could set up actuated signal control. Figure 16 is just one example. We are switching phases 2 & 6 to *Min Recall* and utilizing *Veh* extension to extend the phase. We have set the *Min Green* to roughly the time it would take to clear a queue from the upstream detector to the stop bar. This is a relatively simple approach to actuated signal control. More advanced actuated control would implement features such as *Added Initial* to improve efficiency.

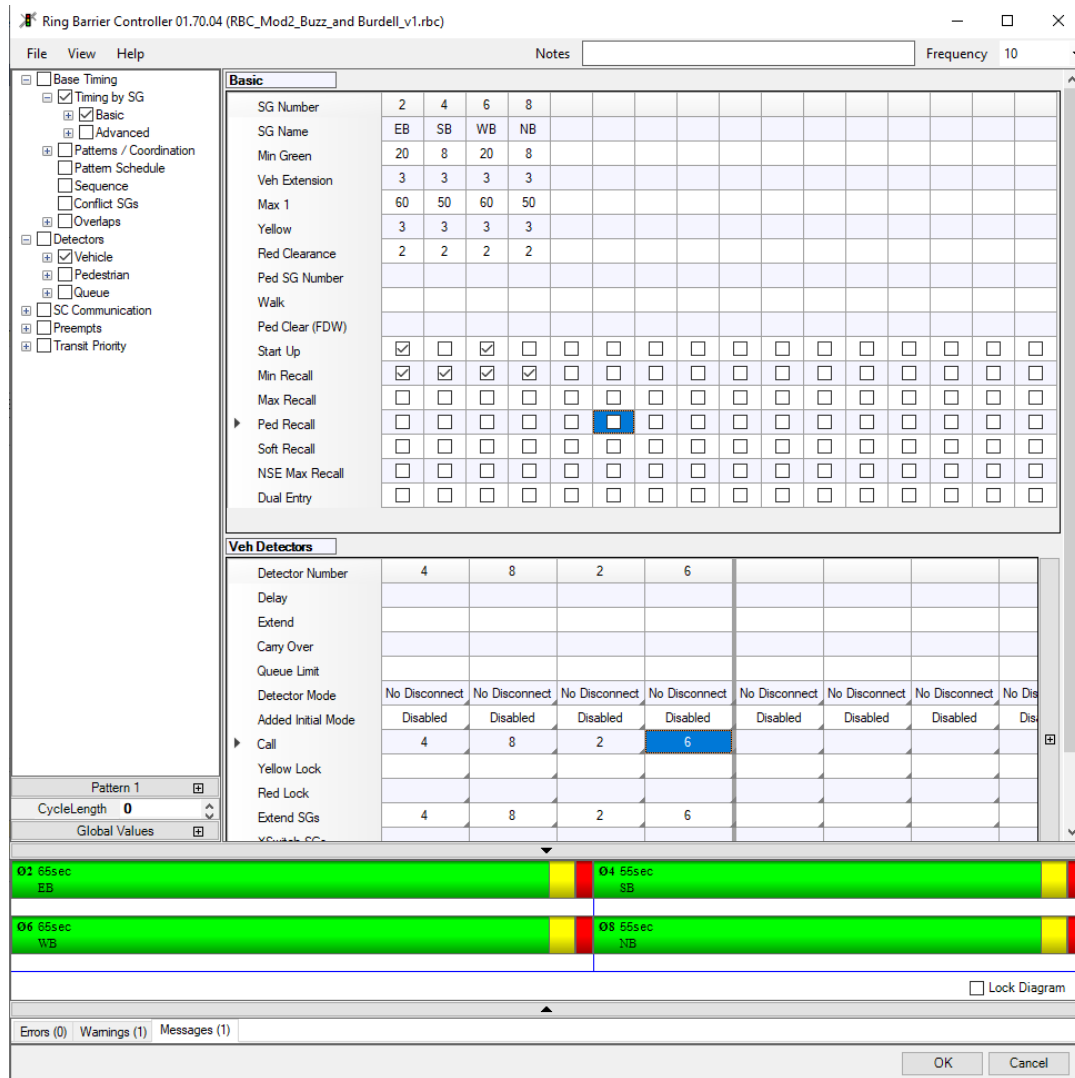


Figure 16: Buzz Blvd and Burdell Dr., Updated Signal Controller Parameters

step xiv. Repeat steps i to xiii for the Buzz Blvd and Ramblin Dr. intersection. Be sure to update the SC to 222. The updated Signal Controller values may be found in Figure 17. Again, we are changing phases 2 & 6 to min recall, increasing phases 2 & 6 min green, and adding detectors.)

(Aside – In the version of Vissim used to write this module (Vissim 11.00-03) there was a buggy behavior in setting the *Detector Before Stop*: value. If this was set to 156 feet when the *Detector* pop-up window was first set the detector would move to a location by intersection 111, even though the SC was set to 222. However, it was seen that by not setting the *Before Stop*: value, closing the *Detector* pop-up, then reopening, the *Before Stop* would set correctly. Hopefully, you will not see this behavior, but occasionally the software (any software) can be a bit buggy. Often the best solution is to delete the current element and try again.)

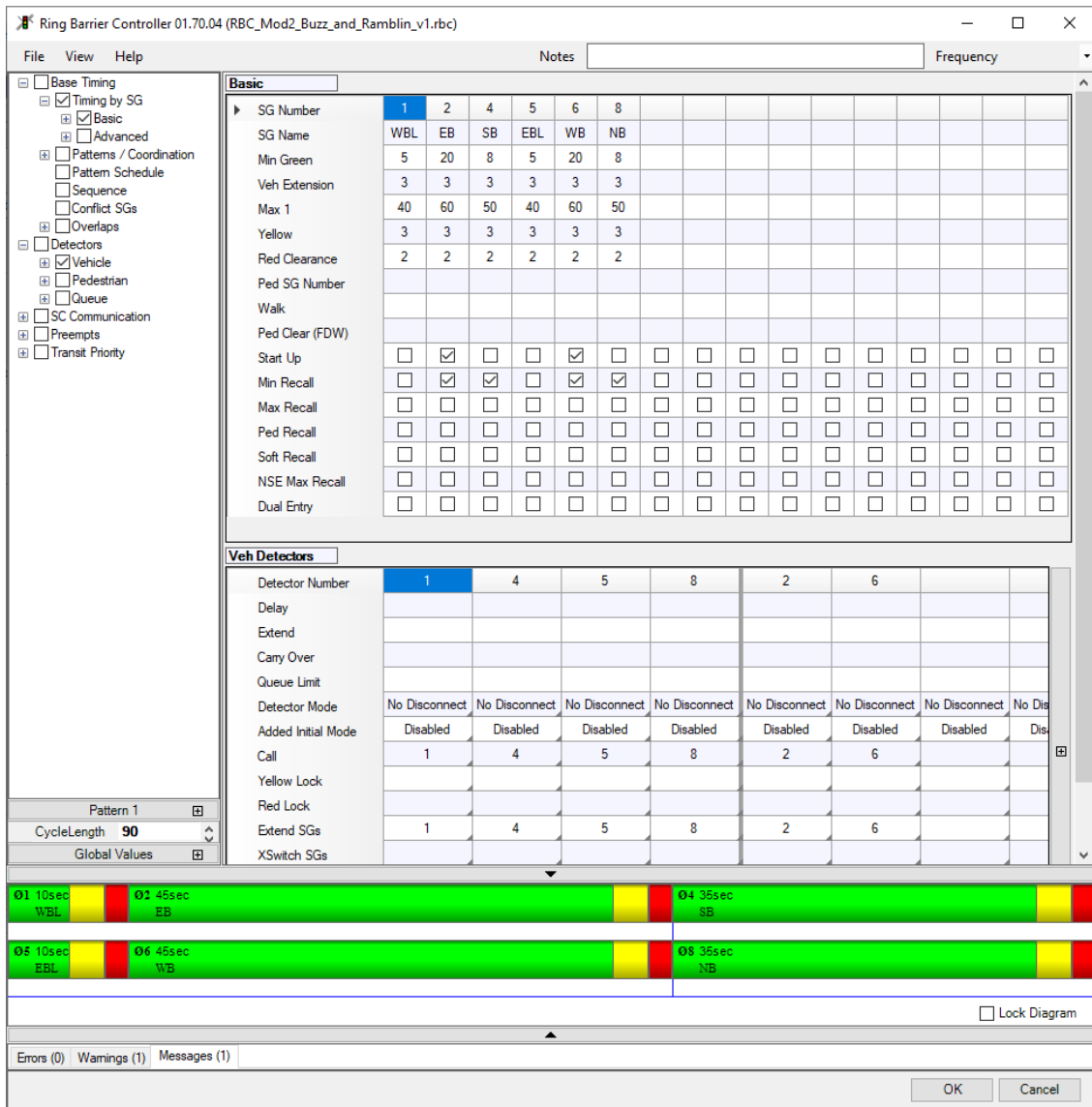


Figure 17: Buzz Blvd and Ramblin St., Updated Signal Controller Parameters

step xv. Repeat steps i to xiii for the Buzz Blvd and Pi Pkwy intersection. Be sure to update the SC to 333. The updated Signal Controller values will be the same as that for the Buzz Blvd and Burdell Dr. intersection, Figure 16

The completed corridor with all detectors placed should look similar to Figure 18. It is a good idea to show the list of detectors (right-click on the *Detectors* icon in *Network Objects*, select *Show List*) and check for mistakes.

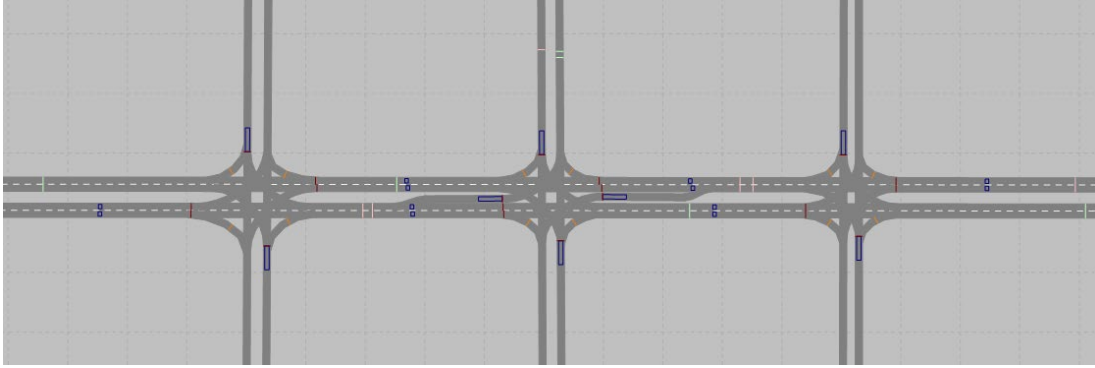


Figure 18: Full Corridor Detector Placement

***** **This is a good time to save the model!** *****

Try running the simulation. Is it behaving as expected? Review the hints about checking the animation. Address any issues you may see.

Signal Coordination

Vissim allows for a number of different coordination patterns, i.e., you may model different coordination settings at different times of day. Coordination is defined in the *RBC controller*, *RBC Pattern* window. As a caution, if an option (such as *Min green*) exists in both the *Base Timing* menu and the *Pattern* menu, the value in the pattern window will govern, with the exception that if a box is checked (e.g., *Max recall*) under the Base Timing settings, it will continue to be treated as checked even if the box is not checked in the pattern settings.

Next, you will set the coordination parameters for each intersection.

Buzz Blvd and Burdell Dr.

- step i. From the menu bar select *Signal Control*, then select *Signal Controllers*. The *Signal Controllers* menu will pop up at the bottom of the screen. (Or, if it is still open, select the *Signal Controller* from the tiles at the bottom of the screen.)
- step ii. In the *Signal Controllers* menu select the Buzz Blvd and Burdell St. intersection, No 111
- step iii. Left-click *Edit Signal Groups*.
- step iv. In the menu tree under *Base Timing* → *Patterns / Coordination* select *Pattern / Coordination* → *Pattern 1* and *Sequence*
- step v. Enter the *Pattern 1* and *Sequence* parameters as shown in Figure 19.
- step vi. Next, we need to update the *Pattern 1* general parameters. These are found in the lower left corner of the *Ring Barrier Control Window*, Figure 19. Set the *Cycle*

to 90, *Offset* to 0, and *MaxGreenMode* to *MaxInhibit*. Leave the other parameters at their default values.

- step vii. Finally, we need to set the *Global Values* for all *Patterns*. These are found in the lower left corner of the *Ring Barrier Control Window* (right below the *Pattern 1* general parameters), Figure 19. Set *OffsetReference* to *CoordEnd*, leave the other parameters as defaults.

Aside: We have set Phases 2 & 6 as the coordination phases. The *Cycle* is 90 seconds and the *Offset* is set to 0. We are also using *Max Inhibit* which means when in coordination the *Max Green* values in the *Basic Timing* will be ignored. In the pattern we set the split lengths, these represent the maximum time given to the non-coordinated phases and the minimum time guaranteed to the coordinated phases. Time not used by a non-coordinated phase (i.e., gap-out) will be used by the coordinated phase, guaranteeing a cycle length of 90 seconds. We have set the coordination point to the end of the coordination phases (i.e. end of red clear of Phases 2 & 6). The *transition times* are set automatically by Vissim, these have to do with allowable changes in phase lengths when Vissim switches between patterns. There are a number of other coordination parameters that could be set. If you need guidance on coordination in general you are encouraged to review the Signal Timing Manual or any other of the many great references. Also, you should reference the RBC manual that comes with the PTV Vissim manual.

- step viii. Complete steps i to vii for the Buzz Blvd and Ramblin St. as in Figure 20. You will notice the offset is now 15 seconds
- step ix. Complete steps i to vii for the Buzz Blvd and Pi Pkwy intersection, as in Figure 19 (the same as the Burdell Dr. intersection). The only difference is to use an offset of 30 sec. (You may notice that the travel time between intersections is approximately 15 seconds, so we have set a green wave for the eastbound direction.)

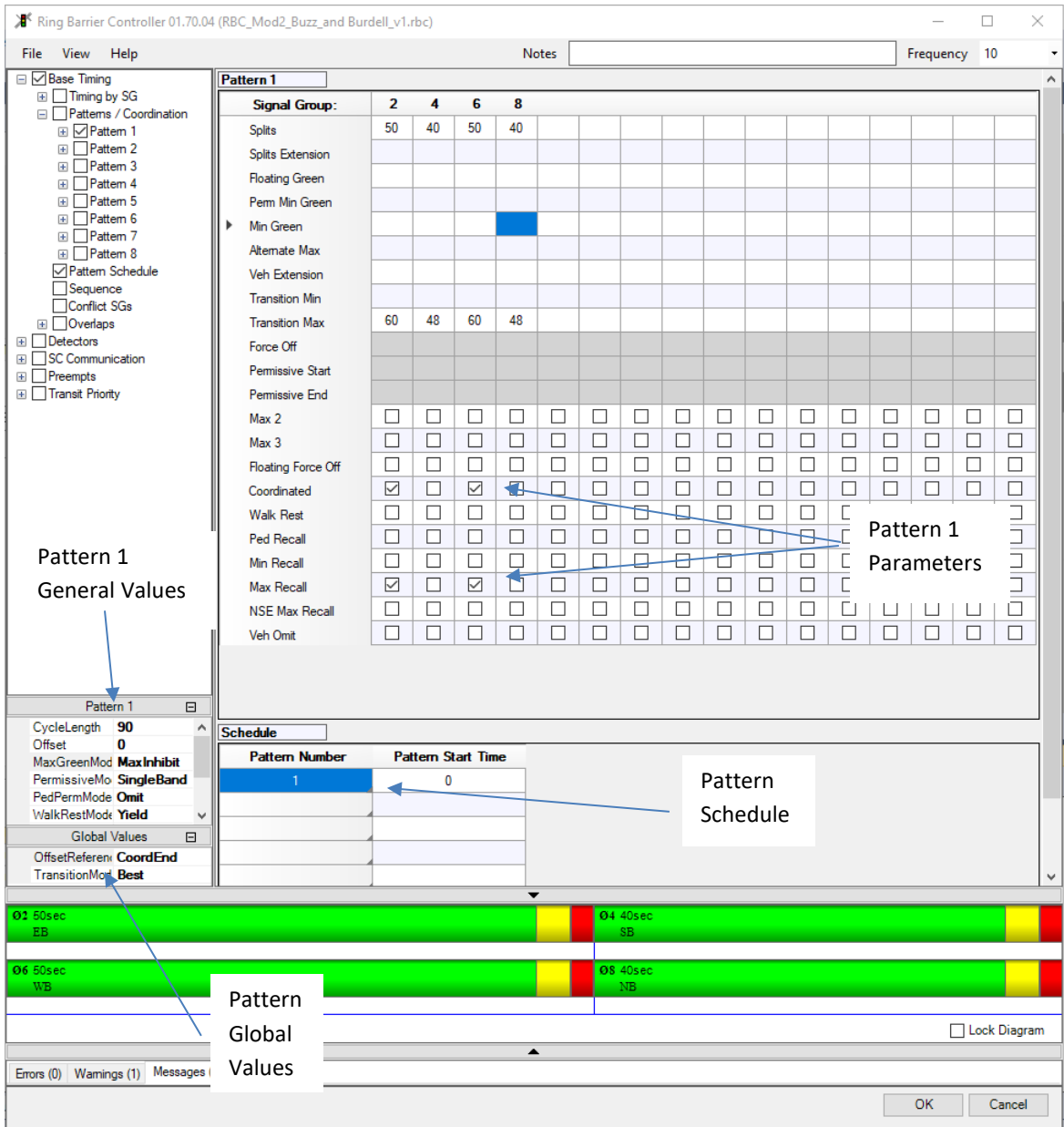
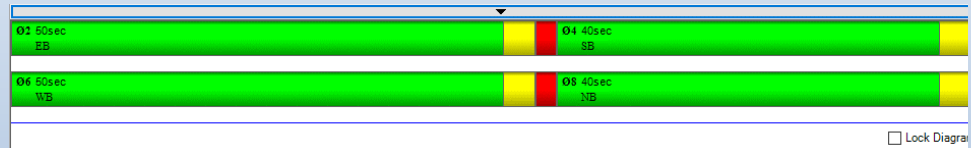


Figure 19: Buzz Blvd and Burdell Dr. Intersection Coordination Parameters

Helpful Hints

You have hopefully noticed near the bottom of the *Ring Barrier Controller* window you should see a graphical representation of the dual ring diagram. This can be useful for checking your timings. You may also use it to edit your timings, as long as *Lock Diagram* is not checked.



At the bottom of the *Ring Barrier Controller* Window you will see *Errors, Warnings, and Messages*. It is good practice to take a minute to check these to see if Vissim has identified any issues.

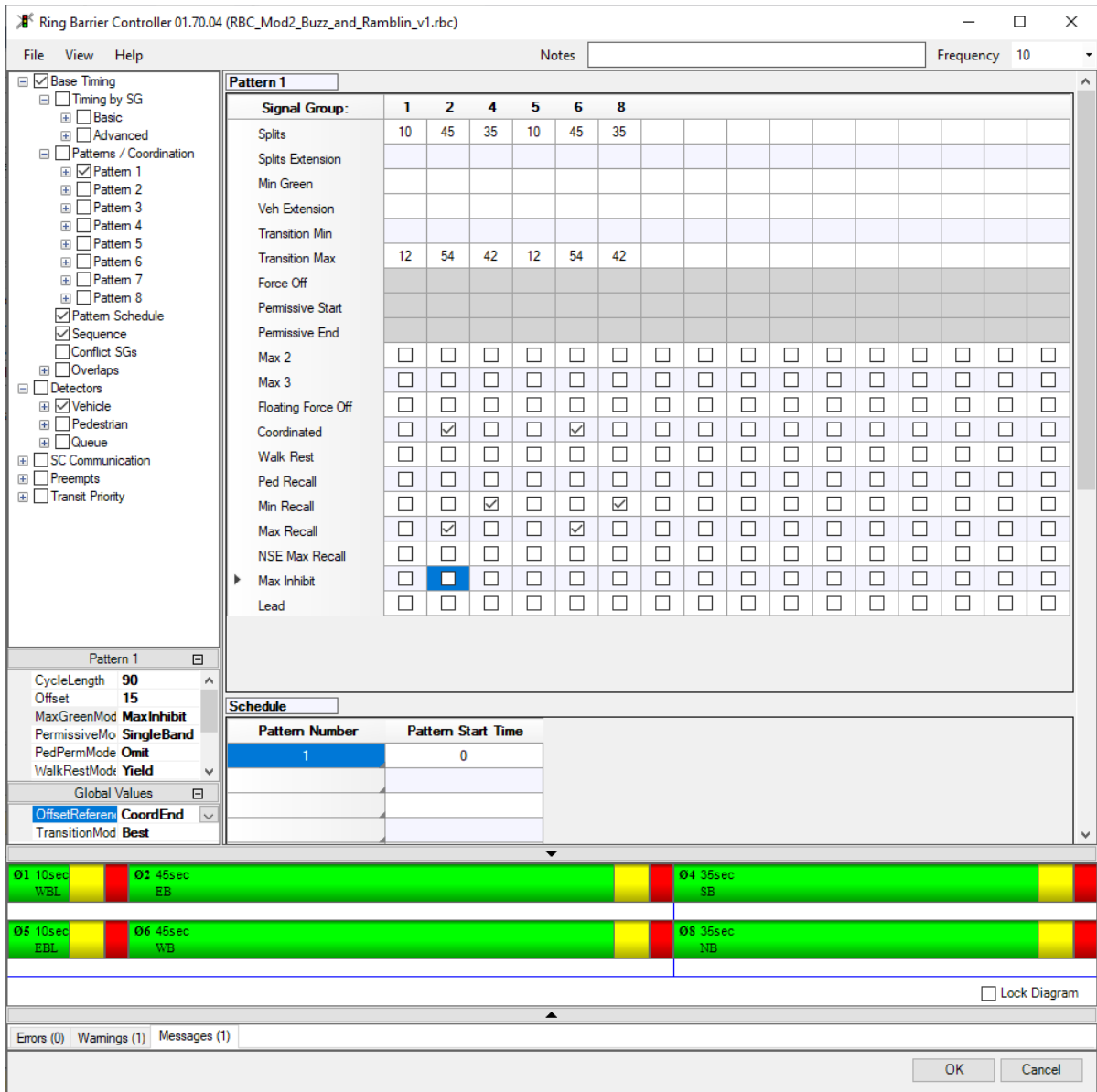


Figure 20: Buzz Blvd and Ramblin Dr. Coordination Settings

This would be a great time to save your model!

Run the model. Carefully watch the animation for errors or issues. Work through the prior instructions to fix any issues you find. (There will be issues, there are always issues!)

CONGRATULATIONS!!!

**You have completed a fully
actuated-coordinated signal
corridor!**

Way to go!!!



Although, we are not quite done yet. Let's do one more thing...


Signal Timing Review Verification

While watching the simulation animation is a powerful means to verify your model's operation there are more detailed reviews that should be undertaken to confirm operations.

For the first review:

- step i. Left-click the *Evaluation* pull down menu.
- step ii. Go to *Window*.
- step iii. Select *Signal Changes*.

The Signal Changes window should open. At the moment it will be empty. Resize the window so you can see your simulation and the window at the same time (to the best of your ability. If you are doing a lot of work with Vissim a two-screen setup because a must-have for efficiency.)
- step iv. Run the model.

The *Signal Changes* window should start populating with the signal changes that are occurring in the simulation. Let the model run for a few minutes then hit the single-step button () , say at approximately simulation time 500 seconds. The Signal change window should look something like Figure 21, although the times may not be exactly the same, as they will depend somewhat on the vehicle arrivals in your model.

Analysis

Let's check to make sure the cycle length is correct at each intersection. To do this we need to look at the coordinated phases' fixed point in the cycle. In our case, this will be the beginning of amber for Phases 2 & 6. (We set coordination to end of the coordination phase, but that is not a variable reported in *Signal Changes*; however, the beginning of amber will work as well as the amber and red clearance times are constant. Also, as a caution, this point is only fixed if during the cycle the phase after the coordinated phase has a call or is in recall.) As a sufficient length of time does not fit within a single Signal Changes Window, read the data you need, then run the model for another 60 seconds (approximately) and press the single-step button again. The data you want is the SimSec (this is the simulation time) for Phases 2 & 6 amber at each intersection. You want consecutive readings of these phases at each intersection; see Figure 21 for an example. The amber values for Phases 2 & 6 for each intersection have been highlighted.

In Figure 21, we see that for intersection 333, Phases 2 & 6 turned amber at 474.9 seconds and then again at 564.9 seconds. This is 90 seconds later, i.e. one cycle length. Thus, the cycle for intersection 333 is 90 seconds, as expected. (Yeah!). Note, the SimSec values for your model may be different; however, the 90-sec difference must still be true!

Check intersection 111. Phases 2 & 6 turn amber at 534.9 and then again at 524.9. Again a 90-second cycle!

Check intersection 222. Phases 2 & 6 turn green at 549.9 and again at 639.9. Again a 90-second cycle!!!

The Signal Changes window is a great resource while debugging a model and for review, a model to see if it is working as expected.

SimSec	CycleSec	SC	SG	Aspect	Prev	Crit	due
464.0	0.0	111	8	red	3.0	Ring	Bar
464.9	0.0	222	4	green	65.4	Ring	Bar
464.9	0.0	222	8	green	65.4	Ring	Bar
466.0	0.0	111	2	green	18.1	Ring	Bar
466.0	0.0	111	6	green	18.1	Ring	Bar
474.9	0.0	333	2	amber	45.0	Ring	Bar
474.9	0.0	333	6	amber	45.0	Ring	Bar
477.9	0.0	333	2	red	3.0	Ring	Bar
477.9	0.0	333	6	red	3.0	Ring	Bar
479.4	0.0	222	4	amber	14.5	Ring	Bar
479.4	0.0	222	8	amber	14.5	Ring	Bar
479.9	0.0	333	4	green	52.0	Ring	Bar
479.9	0.0	333	8	green	52.0	Ring	Bar
482.4	0.0	222	4	red	3.0	Ring	Bar
482.4	0.0	222	8	red	3.0	Ring	Bar
484.4	0.0	222	1	green	70.2	Ring	Bar
484.4	0.0	222	6	green	21.5	Ring	Bar
492.4	0.0	222	1	amber	8.0	Ring	Bar
495.4	0.0	222	1	red	3.0	Ring	Bar
497.4	0.0	222	2	green	34.5	Ring	Bar
514.9	0.0	333	4	amber	35.0	Ring	Bar
514.9	0.0	333	8	amber	35.0	Ring	Bar
517.9	0.0	333	4	red	3.0	Ring	Bar
517.9	0.0	333	8	red	3.0	Ring	Bar
519.9	0.0	333	2	green	42.0	Ring	Bar
519.9	0.0	333	6	green	42.0	Ring	Bar
534.9	0.0	111	2	amber	68.9	Ring	Bar
534.9	0.0	111	6	amber	68.9	Ring	Bar
537.9	0.0	111	2	red	3.0	Ring	Bar
537.9	0.0	111	6	red	3.0	Ring	Bar
539.9	0.0	111	4	green	75.9	Ring	Bar
539.9	0.0	111	8	green	75.9	Ring	Bar
549.9	0.0	222	2	amber	52.5	Ring	Bar
549.9	0.0	222	6	amber	52.5	Ring	Bar
552.9	0.0	222	2	red	3.0	Ring	Bar
552.9	0.0	222	6	red	3.0	Ring	Bar
554.9	0.0	222	4	green	72.5	Ring	Bar
554.9	0.0	222	8	green	72.5	Ring	Bar
564.9	0.0	333	2	amber	45.0	Ring	Bar
564.9	0.0	333	6	amber	45.0	Ring	Bar

SimSec	CycleSec	SC	SG	Aspect	Prev	Crit	duet
554.9	0.0	222	8	green	72.5	Ring	Bar
564.9	0.0	333	2	amber	45.0	Ring	Bar
564.9	0.0	333	6	amber	45.0	Ring	Bar
566.7	0.0	111	4	amber	26.8	Ring	Bar
566.7	0.0	111	8	amber	26.8	Ring	Bar
567.9	0.0	333	2	red	3.0	Ring	Bar
567.9	0.0	333	6	red	3.0	Ring	Bar
569.7	0.0	111	4	red	3.0	Ring	Bar
569.7	0.0	111	8	red	3.0	Ring	Bar
569.9	0.0	333	4	green	52.0	Ring	Bar
569.9	0.0	333	8	green	52.0	Ring	Bar
571.7	0.0	111	2	green	33.8	Ring	Bar
571.7	0.0	111	6	green	33.8	Ring	Bar
575.6	0.0	222	4	amber	20.7	Ring	Bar
575.6	0.0	222	8	amber	20.7	Ring	Bar
578.6	0.0	222	4	red	3.0	Ring	Bar
578.6	0.0	222	8	red	3.0	Ring	Bar
580.6	0.0	222	1	green	85.2	Ring	Bar
580.6	0.0	222	6	green	27.7	Ring	Bar
590.6	0.0	222	1	amber	10.0	Ring	Bar
593.6	0.0	222	1	red	3.0	Ring	Bar
595.6	0.0	222	2	green	42.7	Ring	Bar
604.9	0.0	333	4	amber	35.0	Ring	Bar
604.9	0.0	333	8	amber	35.0	Ring	Bar
607.9	0.0	333	4	red	3.0	Ring	Bar
607.9	0.0	333	8	red	3.0	Ring	Bar
609.9	0.0	333	2	green	42.0	Ring	Bar
609.9	0.0	333	6	green	42.0	Ring	Bar
624.9	0.0	111	2	amber	53.2	Ring	Bar
624.9	0.0	111	6	amber	53.2	Ring	Bar
627.9	0.0	111	2	red	3.0	Ring	Bar
627.9	0.0	111	6	red	3.0	Ring	Bar
629.9	0.0	111	4	green	60.2	Ring	Bar
629.9	0.0	111	8	green	60.2	Ring	Bar
639.9	0.0	222	2	amber	44.3	Ring	Bar
639.9	0.0	222	6	amber	59.3	Ring	Bar
642.9	0.0	222	2	red	3.0	Ring	Bar
642.9	0.0	222	6	red	3.0	Ring	Bar
644.9	0.0	222	4	green	66.3	Ring	Bar
644.9	0.0	222	8	green	66.3	Ring	Bar

Figure 21 Example Signal Changes for Corridor

We can also check the offsets. Intersection 111 had an offset of 0 seconds, intersection 222 had an offset of 15 seconds, and intersection 333 had an offset of 30 seconds. This means that intersection 222 should end phases 2 & 6 (or start amber) 15 seconds after intersection 111 ends phases 2 & 6 (i.e. Offset 222 – Offset 111) and intersection 333 should end phases 2 & 6 (or start amber) 30 seconds after intersection 111 (i.e. Offset 333 – Offset 111). Let's check:

$$\text{Amber start 222} - \text{Amber start 111} = 549.9 - 534.9 = 15 \text{ seconds (Yeah!)}$$

$$\text{Amber start 333} - \text{Amber start 111} = 564.9 - 534.9 = 30 \text{ seconds (Yeah!)}$$

Take some time and check other parameters as well. Are the lengths of green always min green or higher? Are the splits acting as expected? Advance the model to a later period, do the checks still hold?

You can conduct additional checks using the *SC Detector Record Config* tab in the *Signal Controller* menu for any of the intersections. For example:

- step i. Open the Signal Controllers window at the bottom of the screen.
- step ii. In the Signal Controllers menu select Buzz Blvd and Burdell Dr., No 111
- step iii. Open the Signal Controller window for Buzz Blvd and Burdell Dr.
- step iv. Select the *SC Detector Record Config* Tab.
- step v. Under Type select the parameters you want to review (you will select one at a time), for instance, *Active Phase*.
- step vi. Select which rings (1 & 2).
- step vii. Use the green arrow to add these variables to the right side of the window, these are the variables you will see during runtime.
- step viii. Repeat steps v and vi for all of the variables you are interested in. For example, *Active Phase*, *Coordination Split*, *Gap in Effect*, *Cycle time*, and *Simul.second*.
- step ix. Select *OK*.
- step x. Go to the *Evaluation* menu pull down.
- step xi. Go to *Window*.
- step xii. Select *SC Detector Record*.
- step xiii. Select *Intersection 111*.
- step xiv. Select *OK*. The intersection 111 window will pop up. You may want to resize it.
- step xv. Run the simulation.

You will see the variables populate the window. Again, you can use these to make sure the model is operating as expected. As a caution, note that some variables report in tenths of a second. For example, a *Gap in Effect* value of 30 is 3.0 seconds. As you create more complicated timings, using parameters such as added initial, the ability to use data such as this to check operations will become critical.

CRITICAL CONCEPT

What you are doing is verifying the model. Verifying the model does not necessarily mean the model is correct. However, verifying a model is a critical step in demonstrating a model is valid or “correct”.

Loosely, what is the difference between verifying and validating a model? Verifying a model is checking that the model behaves as you expect. Validating a model is an attempt to demonstrate a model is “correct”, e.g., is representative of the field. For example, we have verified that the cycle being simulated is 90 seconds, which is what we expected. However, if we compare our model against the field and found out the cycle in the field is 100 seconds, then the model is not a valid representation of the field. That is, it is doing what we expect but unfortunately, we programmed the wrong cycle!