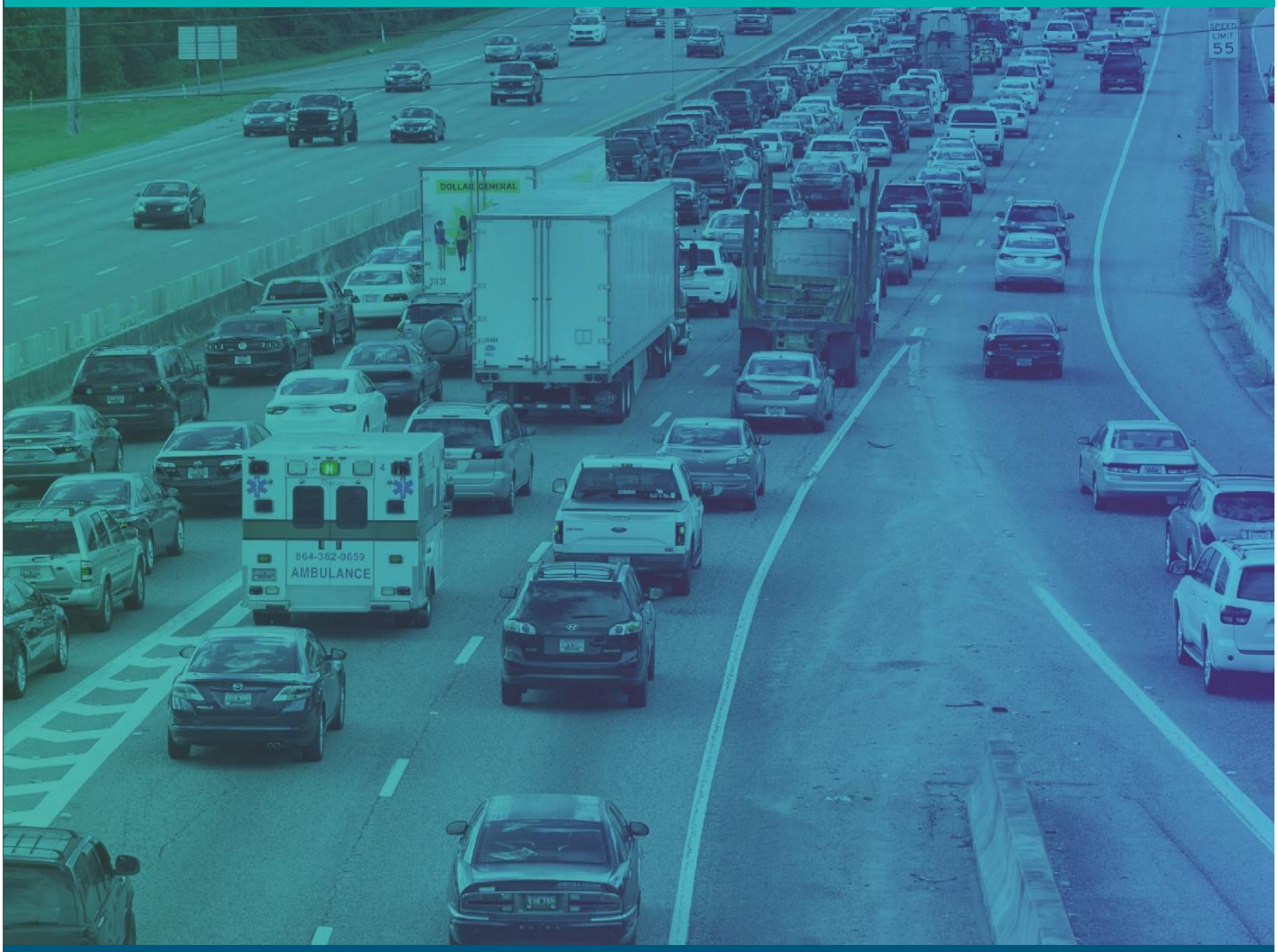
CAROLINA CROSSROADS



Settings and Parameters Report

I-20/I-26/I-126 Systems Interchange Modification Report (Systems IMR) Re-evaluation

October 1, 2026

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1. Introduction

This report documents the parameters and settings used to develop TransModeler files for I-20/I-26/I-126 Systems Interchange Modification Report (Systems IMR) Re-evaluation (March 2026). The Systems IMR study area covers I-26 from Piney Grove Road to US 378, I-20 from east of US 378 to the Broad River, I-126 from I-26 to Greystone Boulevard. The study area includes all ramp terminal intersections adjacent to the ten study interchanges along I-20, I-26, and I-126.
This report documents the key settings, parameters, and assumptions used in the TransModeler models for the I-20/I-26/I-126 Systems IMR Re-evaluation. The purpose is to provide a record of the model configuration for review, and future model updates.

2. Methodology

The study area is evaluated using Caliper's microsimulation modeling software, TransModeler version 7 Build 10280. TransModeler is a microscopic behavior-based multi-purpose traffic simulation program that takes into consideration vehicle interaction and driver behaviors, as well as the operational impacts for both the upstream and downstream traffic conditions and can measure traffic densities on each segment and lane. TransModeler tracks individual vehicle movements and interactions more realistically than typical HCM methods and quantifies the performance of individual movements and overall delays and queue lengths for freeways, ramps, and intersections.

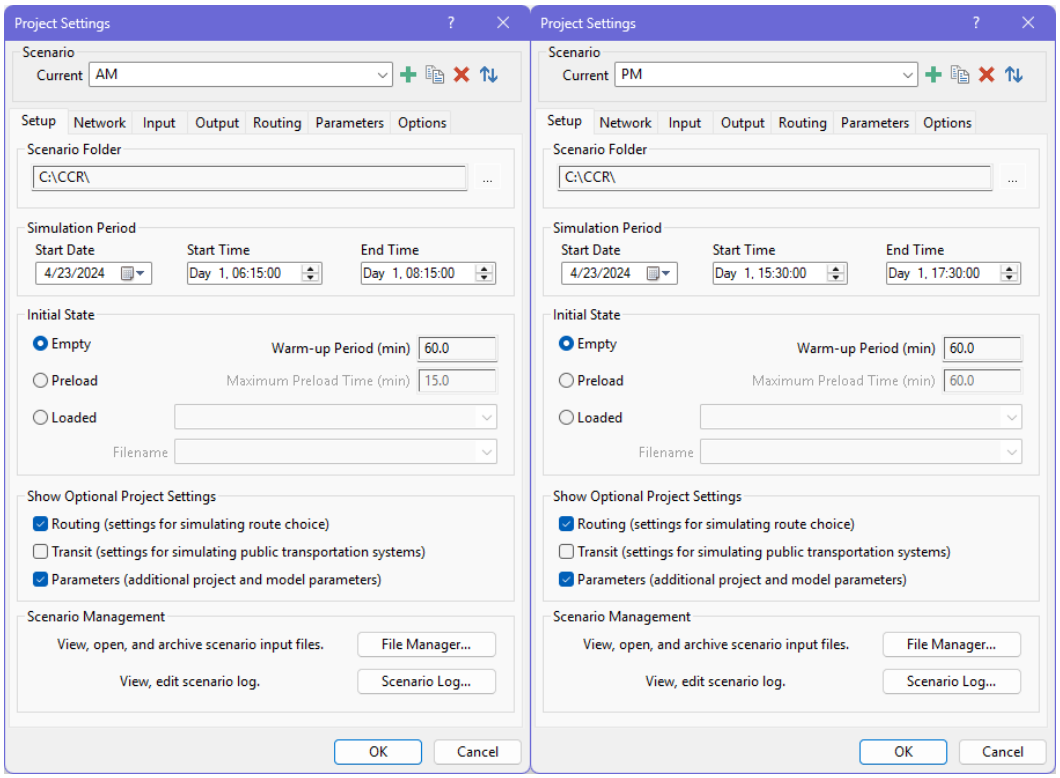
The analysis methodology is consistent with the FHWA Policy No. 98-3460 (Federal Register; February 11, 1998; Volume 63, Number 28) and procedures outlined in the FHWA Interchange Access Request. The methodology is consistent with the previously approved 2019 Systems IMR methodology. The methodology was discussed and developed in coordination with SCDOT and FHWA.

3. TransModeler Project Setting

Two scenarios, AM and PM, were created under the Project Settings. The simulation period was specified for each scenario, with a 60-minute warm-up period and an empty initial state selected**. Figure 1** presents the TransModeler Project Settings–Setup window.

A global peak hour of 7:15 AM to 8:15 AM for the AM period and 4:30 PM to 5:30 PM for the PM period was identified for the study area based on traffic counts collected in April 2024. Based on the existing traffic count data, AM and PM peak-hour traffic profiles were developed and applied to the respective scenarios. The project settings found in Figure 1 shall remain consistent between models.

Figure 1 Project Settings-Setup

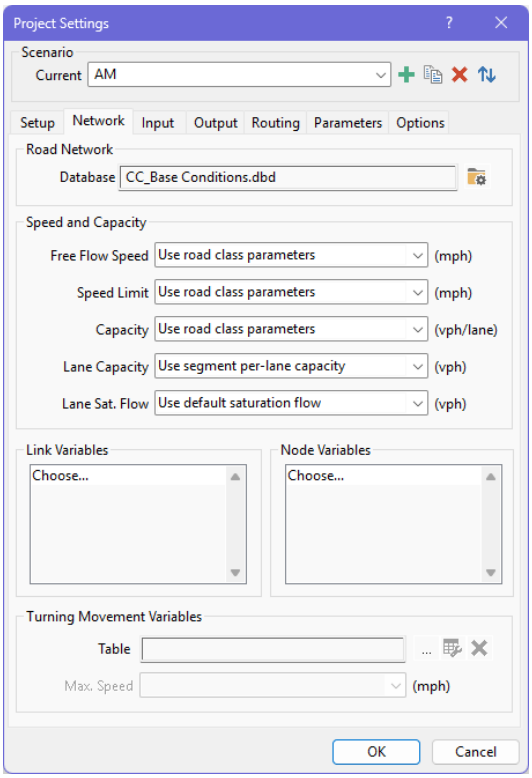


3.1. Project Settings – Network

The road network for a simulation project is defined within the simulation database. All roadway network edits are automatically saved by TransModeler in the CC_Base Conditions.dbd database. As changes are made to the network, the database is automatically updated.

The Project Settings–Network section includes parameters related to link speed, capacity settings, and roadway class information. Link speed and capacity are determined based on the assigned roadway class parameters, which are further discussed in Section 8 (Road Classification Parameters). Speed and Capacity settings are set to their default parameters and shall remain as default as shown in **Figure 2**. **Figure 2** presents the Project Settings – Network window.

Figure 2 Project Setting- Network



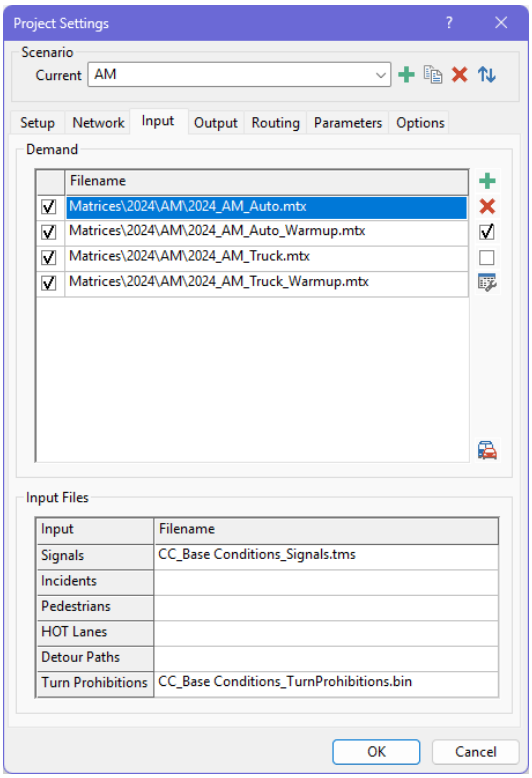
3.2. Project Settings – Input

The Project Settings – Input section defines common model inputs such as trip tables that describe demand, signal timing plans for simulating traffic control devices, incidents, pedestrians, high occupancy toll (HOT) lanes, detours, and turn prohibitions for controlling undesirable link sequences.

Outside of demand inputs - parameters are created within the TransModeler software using built in tools and are saved as files that TransModeler reads/writes to automatically. Turn Prohibitions shall be unchanged except under circumstances where new undesirable link sequences are present and justification and documentation are provided. Traffic Signal timing plans shall remain unchanged unless justification and documentation are provided for any changes made. **Figure 3** presents the Project Settings – Input window.

Separate origin-destination (O-D) trip matrices were developed for the AM and PM scenarios by vehicle class, including automobiles and trucks. Each scenario includes a peak-period matrix and a corresponding warm-up matrix. The peak-period matrices represent the O-D demand assigned during the respective analysis period, while the warm-up matrices are used during the 60-minute initialization period to establish representative pre-peak network loading and traffic conditions prior to the analysis period.

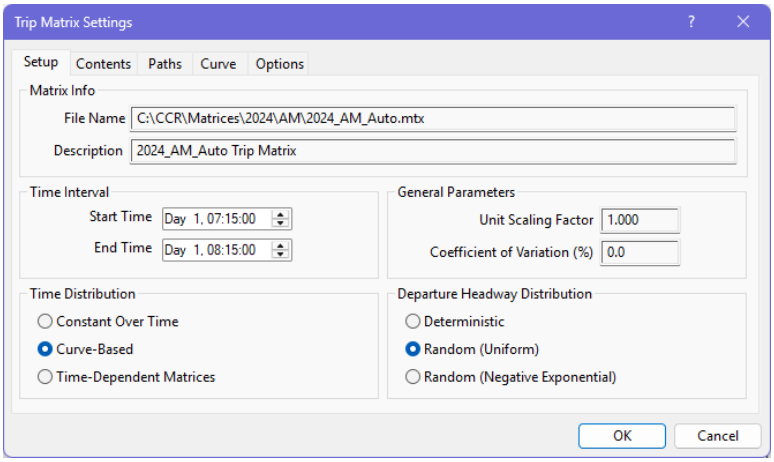
Figure 3 Project Settings- Input



Within the Project Settings – Input window, parameters for trip tables can be further modified. This second component governs the specifics of how trips should be simulated within the network. The Trip Matrix Settings window can be found in **Figure 4**.

Values for the Unit Scaling Factor, Time Distribution, and Departure Headway Distribution shall remain as 1.000, Curve-Based, and Random (Uniform) respectively (except warmup matrices). See TransModeler files for Trip Matrix Settings across all matrices.

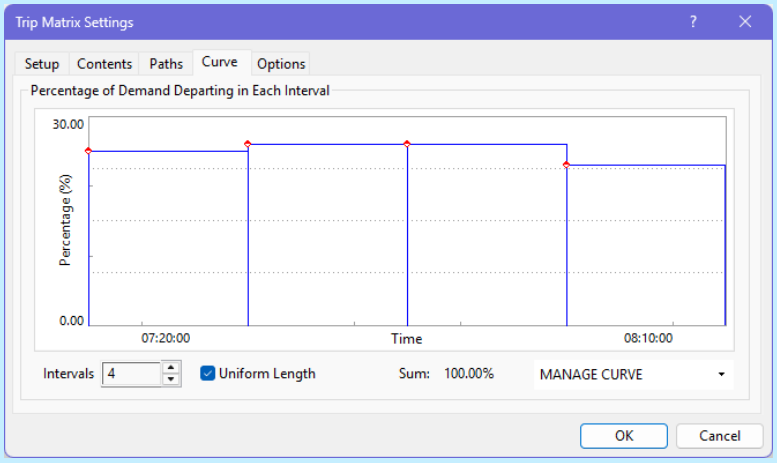
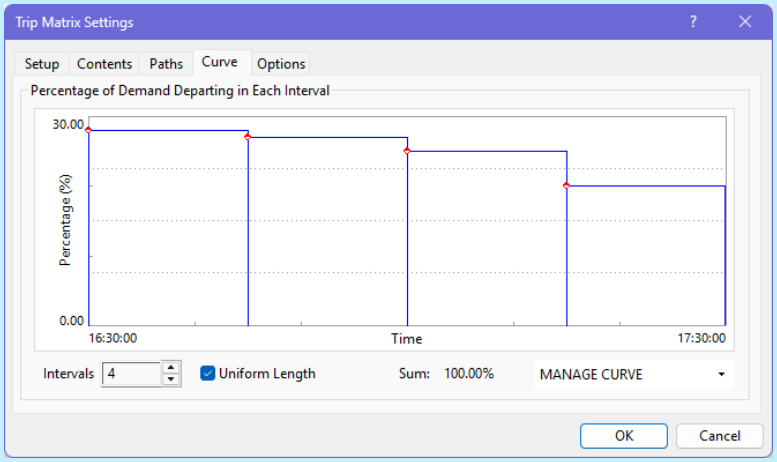
Figure 4 Trip Matrix Settings-Setup



3.2.1 Trip Matrix Settings

Trip Matrix Settings define how the total traffic demand is distributed throughout the simulation period. **Table 1** shows the time distribution curves used to define the traffic demand over the simulation period, broken out into discrete 15-minute intervals where the area under the curve sums to 100% for the AM and PM peaks respectively. Matrix Curves Settings shall remain consistent between models. See TransModeler files for exact curve distributions.

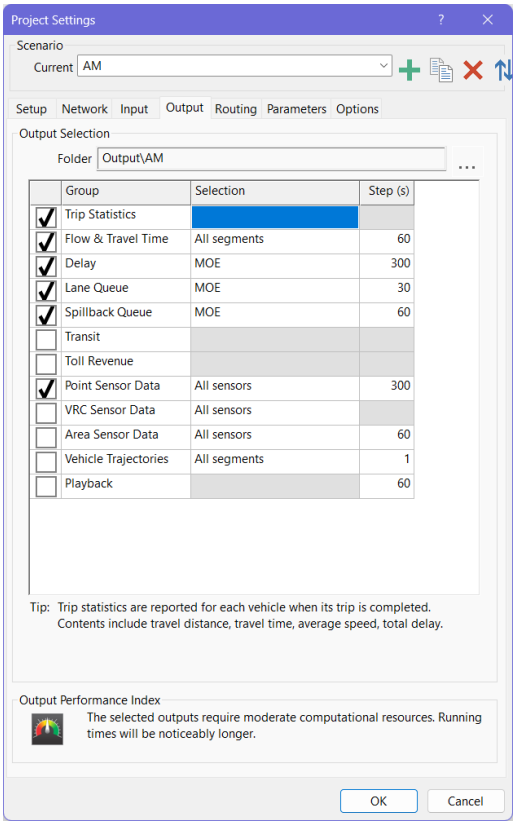
Table 1 Trip Matrix Settings- Curve

Peak Hour	Traffic Flow Profile
AM	
PM	

3.3 Project Settings - Output

The Project Settings – Output tab determines the types of output statistics that will be collected during each simulation run. These options are further broken down into: “Folder” specifying where data is saved, “Group” (Boolean) that determines what types of outputs are collected, “Selection” defining a subset of network features where data will be collected, and “Step” which relates to the frequency with which output data is measured and/or recorded. An example of the Project Settings – Output tab is found in **Figure 5**. All intersections that are being evaluated must be included in the “MOE” selection set; all outputs selected in **Figure 5** shall remain selected.

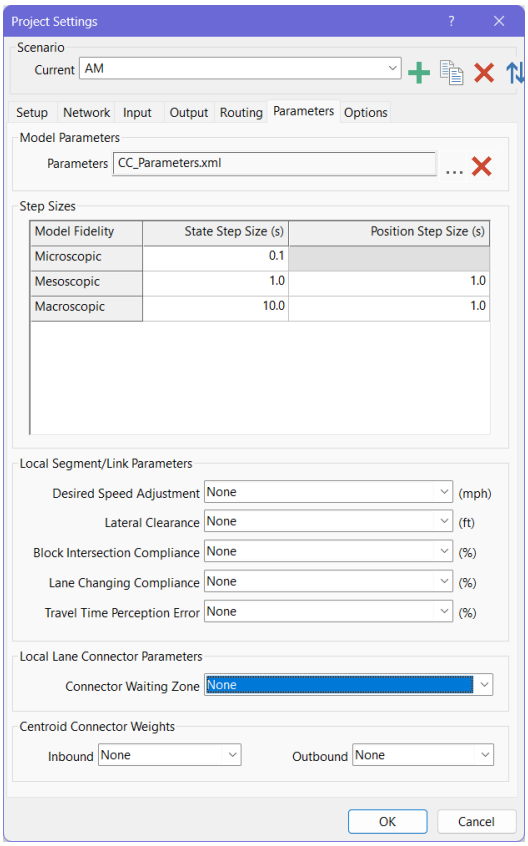
Figure 5 Project Settings- Output



3.4 Project Settings - Parameters

The Project Settings – Parameters tab governs project-by-project parameters for localized model adjustments and step size fidelity. Local Segment/Link Parameters, Local Lane Connector Parameters, and Centroid Connector Weights are all defined in custom fields in their respective data tables. An example of the Project Settings – Parameters tab can be found in **Figure 6**. Values in **Figure 6** are default values.

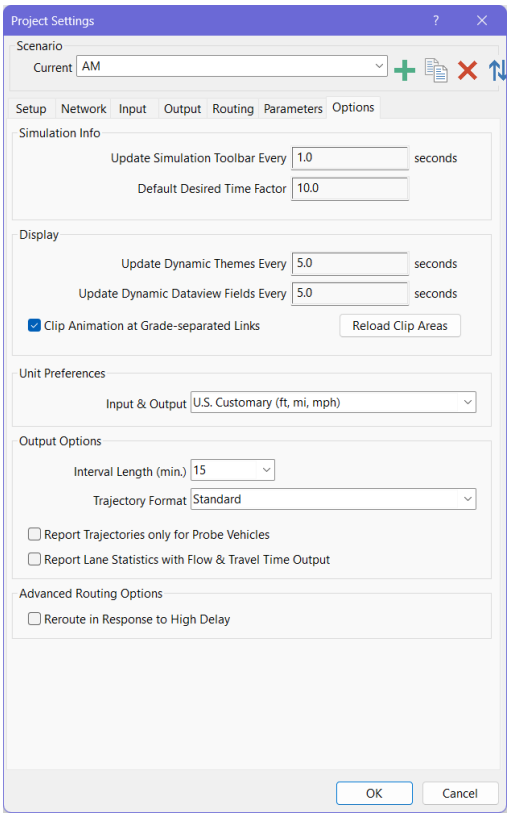
Figure 6 Project Settings- Parameters



3.5 Project Settings – Options

The Project Settings – Options tab is unrelated to the simulation model and present avenues to adjust the way information is updated and/or displayed in maps and dataviews during a simulation and control the units that model inputs/outputs represent. An example of the Project Settings – Options tab can be found in **Figure 7**.

Figure 7 Project Settings- Options

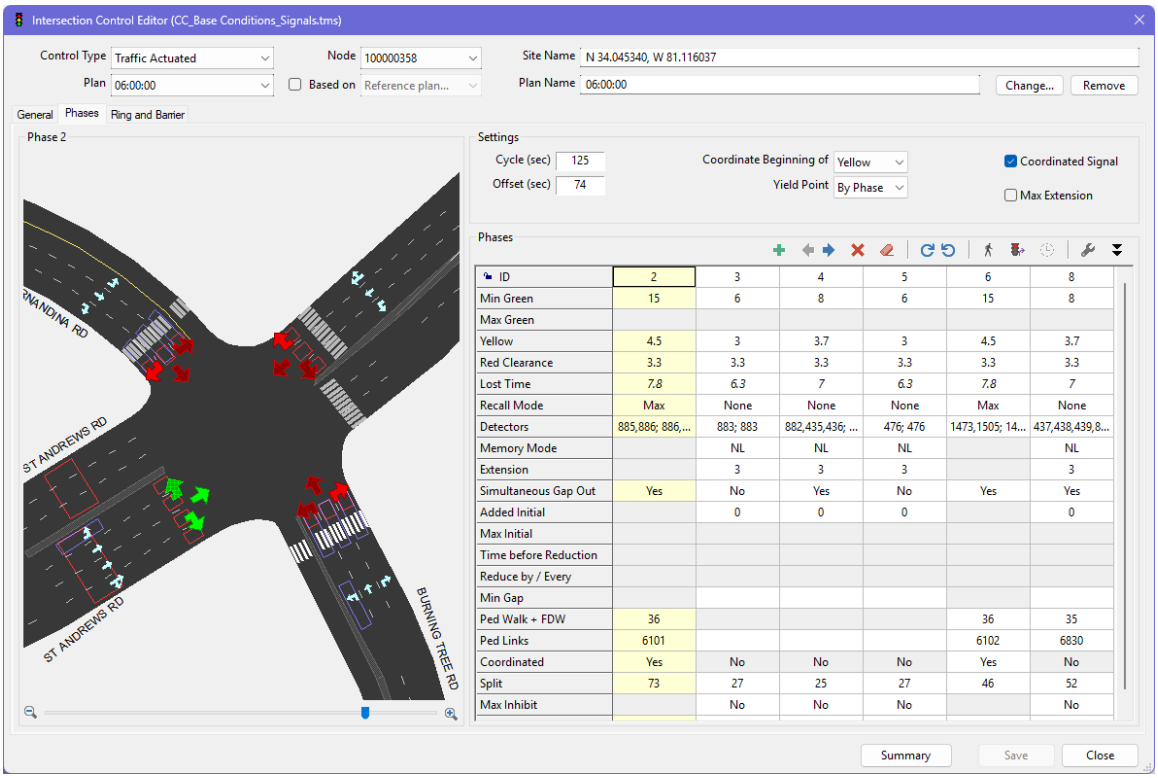


4. Intersection Control

Intersection control is a critical input to a simulation project as it directly affects traffic operations, vehicle delay, queue formation, and route selection. The intersection control editing tools in TransModeler are used to place and configure stop signs, yield signs, and traffic signals at intersections throughout the network.

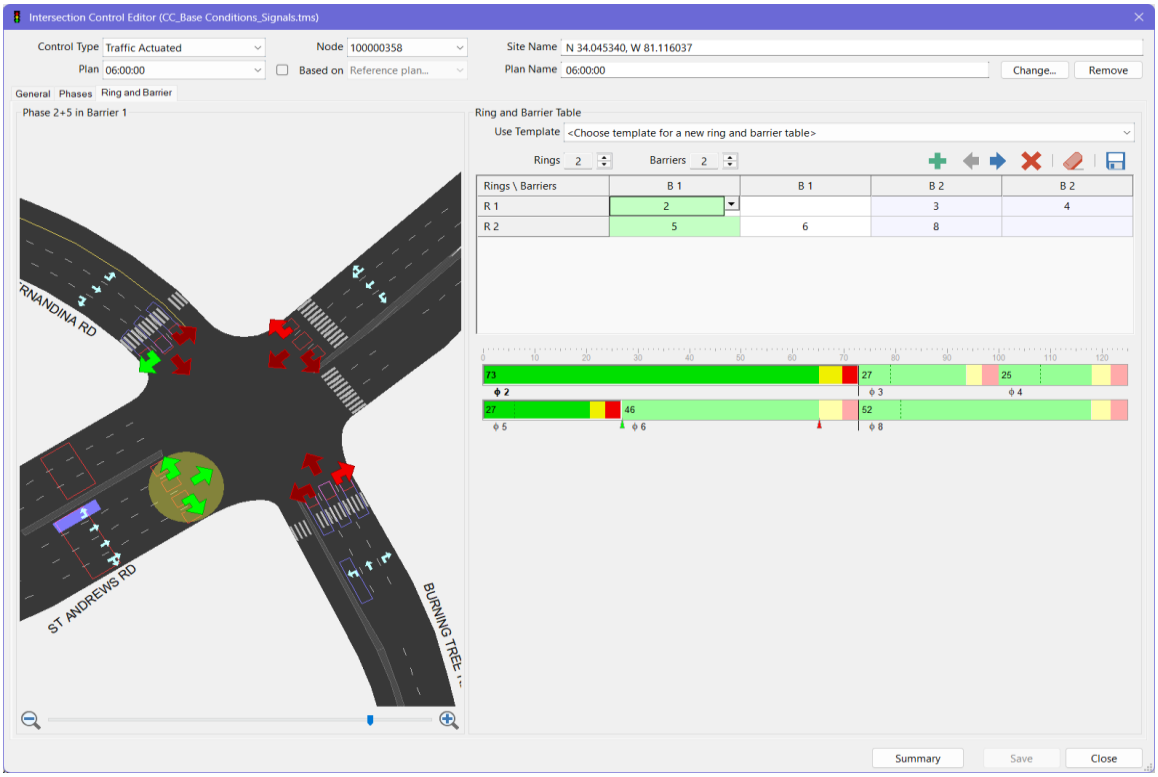
For signalized intersections, the TransModeler Intersection Control Editor include the signal timing settings for each intersection in the modeled network. These settings define the signal controller operation, including the signal phases, phase sequence, cycle length, green, yellow, and all-red intervals, and associated ring and barrier structure, as applicable. The TransModeler project files include the signal timing settings for each signalized intersection in the network. An example of a signal controller phase assignment and ring and barrier diagram are provided in **Figure 8** and **Figure 9**, respectively.

Figure 8 Intersection Control Editor, Phases:



ID	2	3	4	5	6	8
Min Green	15	6	8	6	15	8
Max Green						
Yellow	4.5	3	3.7	3	4.5	3.7
Red Clearance	3.3	3.3	3.3	3.3	3.3	3.3
Lost Time	7.8	6.3	7	6.3	7.8	7
Recall Mode	Max	None	None	None	Max	None
Detectors	885,886; 886,...	883; 883	882,435,436; ...	476; 476	1473,1505; 14...	437,438,439,8...
Memory Mode		NL	NL	NL		NL
Extension		3	3	3		3
Simultaneous Gap Out	Yes	No	Yes	No	Yes	Yes
Added Initial		0	0	0		0
Max Initial						
Time before Reduction						
Reduce by / Every						
Min Gap						
Ped Walk + FDW	36				36	35
Ped Links	6101				6102	6830
Coordinated	Yes	No	No	No	Yes	No
Split	73	27	25	27	46	52
Max Inhibit		No	No	No		No

Figure 9 Intersection Control Editor, Ring and Barrier:



Rings \ Barriers	B 1	B 1	B 2	B 2
R 1	2		3	4
R 2	5	6	8	

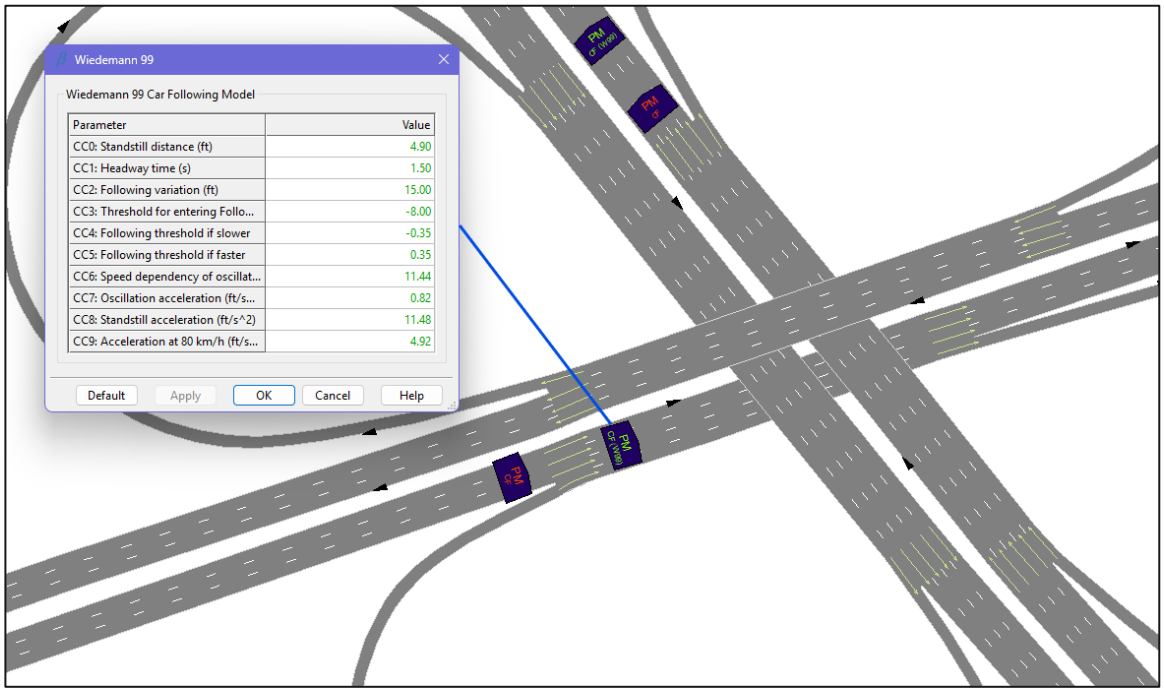
5. Parameter Markers (Local Parameters)

Parameter markers represent a subset of driver behavior parameters that are used to account for distinct changes in driver behavior that are observed or understood to exist at specific areas in the simulation network. The use of a parameter marker overrides the global parameter for all eligible drivers that pass over it during a simulation run; when paired with a downstream ending marker, drivers return to the globally defined behavior. This localized behavior allows for adjustments to behavior that could be unreasonable at a global scope.

Parameters markers are placed at specific locations on a network link using the Parameter Markers Toolbar. An example of a local Car Following parameter marker is found in **Figure 10**; values for CC0, CC1, and CC2 are the only modified values.

Parameter Markers for merging, diverging, and weaving movements are found throughout the network. Parameter Markers shall remain consistent between models, unless their modification, adjustment, or exclusion is justified and fully documented**.** See TransModeler files for the locations and values of all parameter markers found within the network(s).

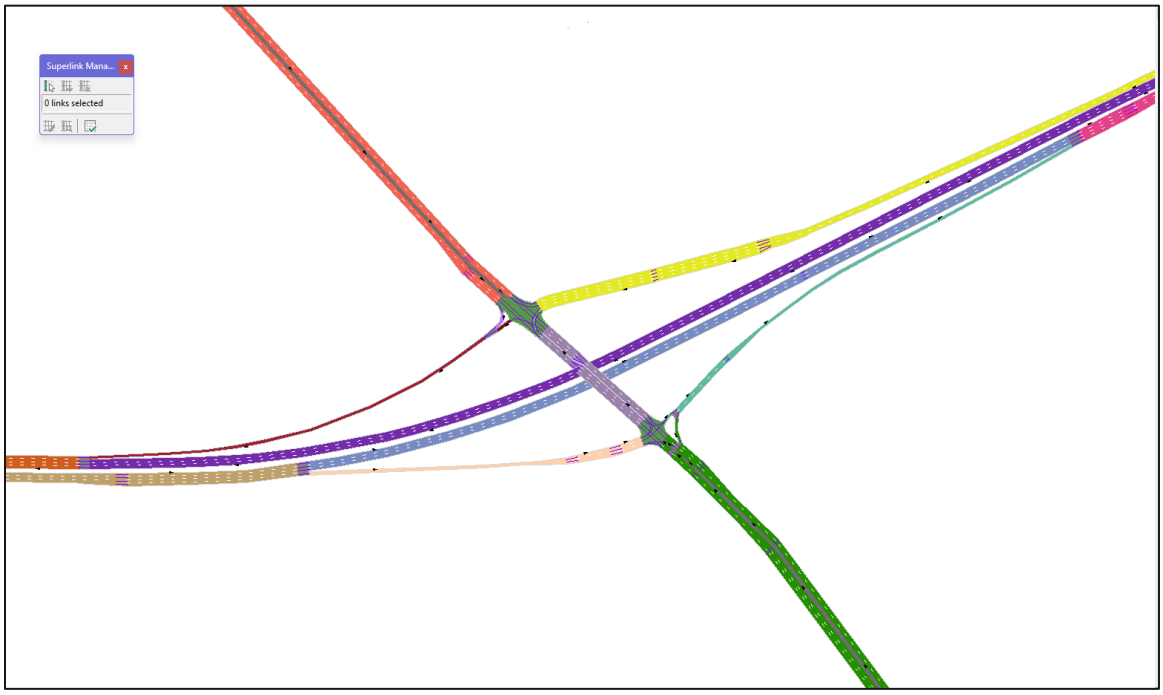
Figure 10 Car Following Parameter Marker Example



6. Superlink Manager

Superlinks are a series of (connected) links that are grouped together to dictate how TransModeler computes output delay and queue measurements. Delay and queue statistics are measured by link, however, links as they are drawn in the network may not represent a sensible segmentation of the network for the purpose of reporting delay and queue statistics. The Superlink Manager is used to define a span of road along which delay and queue statistics will be continuous by combining links to form a “superlink”. An example of superlink definitions is found in **Figure 11**, where superlinks that share the same ID are highlighted in the same color.

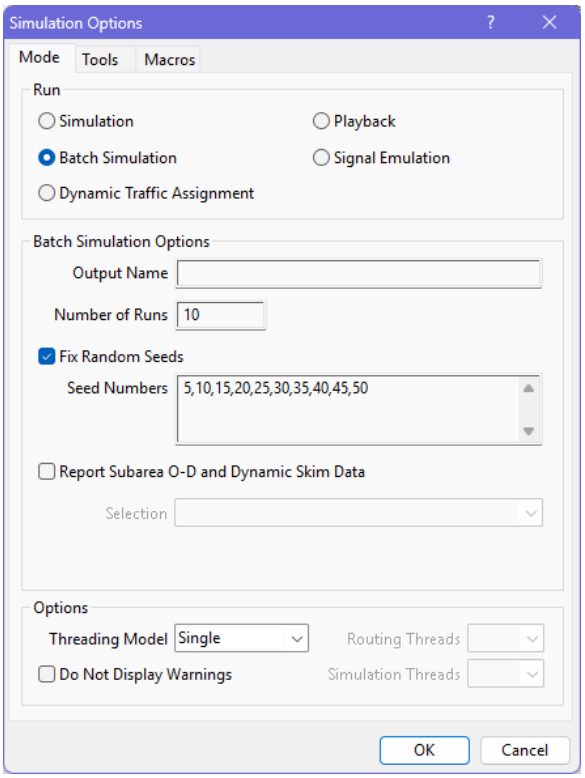
Figure 11 Superlink Definitions Example:



7. Simulation Options

Due to the varying nature of the simulations between runs with different random seed numbers, TransModeler results can differ from one run to the next. Multiple runs are required to improve model accuracy, and the results should be calculated using an average of these runs. Ten (10) runs were performed for the models, with random seed numbers ranging from 5 to 50 with increments of 5. Simulation Options can be found in **Figure 12**. Random seeds shall remain consistent between models. Models shall be run using fixed seeds and the single threading model.

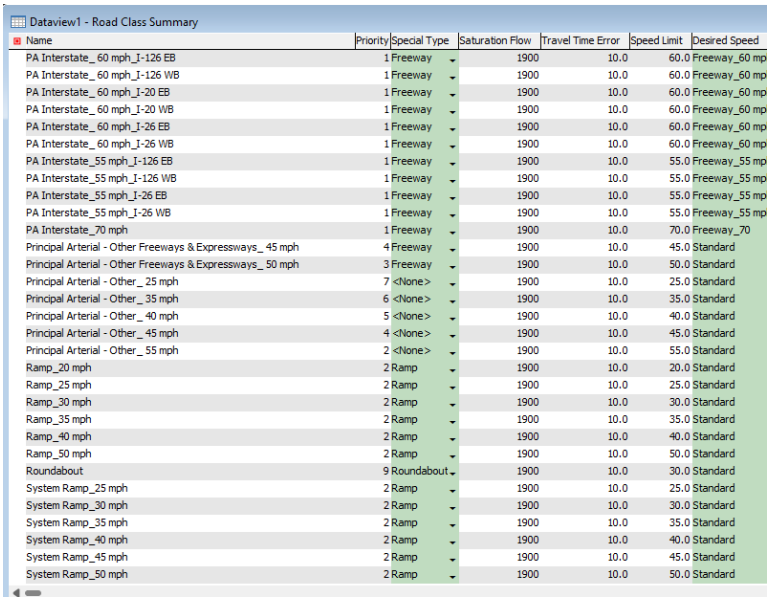
Figure 12 Simulation Options, Mode:



8. Road Classification Parameters

Road classes distinguish different types of facilities by important traffic flow parameters. Road classes were developed and named by functional classification and speed limit. Road classes are analogous to functional classes. Road classes are only defined at the project level. Road classifications are presented in **Figure 13.**

Figure 13 Roadway Classifications



Dataview1 - Road Class Summary

Name	Priority	Special Type	Saturation Flow	Travel Time Error	Speed Limit	Desired Speed
PA Interstate_ 60 mph_I-126 EB	1	Freeway	1900	10.0	60.0	Freeway_60 mp
PA Interstate_ 60 mph_I-126 WB	1	Freeway	1900	10.0	60.0	Freeway_60 mp
PA Interstate_ 60 mph_I-20 EB	1	Freeway	1900	10.0	60.0	Freeway_60 mp
PA Interstate_ 60 mph_I-20 WB	1	Freeway	1900	10.0	60.0	Freeway_60 mp
PA Interstate_ 60 mph_I-26 EB	1	Freeway	1900	10.0	60.0	Freeway_60 mp
PA Interstate_ 60 mph_I-26 WB	1	Freeway	1900	10.0	60.0	Freeway_60 mp
PA Interstate_55 mph_I-126 EB	1	Freeway	1900	10.0	55.0	Freeway_55 mp
PA Interstate_55 mph_I-126 WB	1	Freeway	1900	10.0	55.0	Freeway_55 mp
PA Interstate_55 mph_I-26 EB	1	Freeway	1900	10.0	55.0	Freeway_55 mp
PA Interstate_55 mph_I-26 WB	1	Freeway	1900	10.0	55.0	Freeway_55 mp
PA Interstate_70 mph	1	Freeway	1900	10.0	70.0	Freeway_70
Principal Arterial - Other Freeways & Expressways_ 45 mph	4	Freeway	1900	10.0	45.0	Standard
Principal Arterial - Other Freeways & Expressways_ 50 mph	3	Freeway	1900	10.0	50.0	Standard
Principal Arterial - Other_ 25 mph	7	<None>	1900	10.0	25.0	Standard
Principal Arterial - Other_ 35 mph	6	<None>	1900	10.0	35.0	Standard
Principal Arterial - Other_ 40 mph	5	<None>	1900	10.0	40.0	Standard
Principal Arterial - Other_ 45 mph	4	<None>	1900	10.0	45.0	Standard
Principal Arterial - Other_ 55 mph	2	<None>	1900	10.0	55.0	Standard
Ramp_20 mph	2	Ramp	1900	10.0	20.0	Standard
Ramp_25 mph	2	Ramp	1900	10.0	25.0	Standard
Ramp_30 mph	2	Ramp	1900	10.0	30.0	Standard
Ramp_35 mph	2	Ramp	1900	10.0	35.0	Standard
Ramp_40 mph	2	Ramp	1900	10.0	40.0	Standard
Ramp_50 mph	2	Ramp	1900	10.0	50.0	Standard
Roundabout	9	Roundabout	1900	10.0	30.0	Standard
System Ramp_25 mph	2	Ramp	1900	10.0	25.0	Standard
System Ramp_30 mph	2	Ramp	1900	10.0	30.0	Standard
System Ramp_35 mph	2	Ramp	1900	10.0	35.0	Standard
System Ramp_40 mph	2	Ramp	1900	10.0	40.0	Standard
System Ramp_45 mph	2	Ramp	1900	10.0	45.0	Standard
System Ramp_50 mph	2	Ramp	1900	10.0	50.0	Standard

9. Desired Speed Distributions

Default TransModeler National Highway Traffic Safety Administration (NHTSA) Desired Speed distribution profiles were used for arterials and modified based on Regional Integrated Transportation Information System (RITIS) data for freeway segments. The desired speed distributions used for the study are shown in **Table 2**.

Table 2 Desired Speed Distributions

Deviation from Speed Limit (mph)	Driver Population (%)		
	Arterial/ Standard	Freeway (60 mph/55 mph)	Freeway (70 mph)
-10	2	1	5
-5	5	4	10
0	15	25	70
5	25	30	11
10	25	20	3
15	15	15	1
20	10	4	0
25	3	1	0