

**A Comparison of the VISSIM and CORSIM Traffic Simulation Models  
On A Congested Network**

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**A Comparison of the VISSIM and CORSIM Traffic Simulation Models  
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**Loren Bloomberg and Jim Dale**

***Abstract***

Traffic simulation packages like CORSIM and VISSIM are frequently used as tools for analyzing traffic, since they are an effective approach for quantifying the benefits and limitations of different alternatives. There may be those who are cautious or skeptical about the application of a complex program to make a critical design decision. This concern is often appropriate, as many models are unproven or there is little information available about their accuracy.

As these simulation models become easier to use, it may be practical to use more than one model on some studies. The two-model approach was applied in this study as a means of making the analysis more reliable, and the results more defensible. The results proved the consistency and reasonableness of the simulation tools, and provided everyone involved with confidence about the analysis. This study also illustrated the value in using a range of performance measures, and a sensitivity analysis. More generally, it proved the value in providing as much comparative information as possible before making a design decision. The results were generally consistent, and the end product was a set of clear, defensible, and well-supported conclusions.

While the experience gained through the application of CORSIM and VISSIM in this study was in some ways unique to the study area, this experience can provide insight to other transportation professionals charged with selecting and applying these simulation models to similar networks. To that end, some of the characteristics of both models are contrasted in this paper.

## **INTRODUCTION AND PURPOSE**

This paper summarizes the findings of a comprehensive traffic operations analysis conducted using two simulation models, CORSIM and VISSIM. Traffic simulation packages like CORSIM and VISSIM are frequently used as tools for analyzing traffic. A common example is the analysis of multiple alternatives for a roadway design. Simulation modeling is an effective approach for quantifying the benefits and limitations of different alternatives.

Typically, a single software package (e.g., CORSIM) is selected for these types of analyses. The specific model selected will depend on the circumstances (e.g., the type of facility, and the experience of the staff assigned to apply the simulation model). Regardless of the model selected, most researchers and practitioners working with simulation models will develop a calibrated base model of existing conditions, extend the model to include the design alternatives (generally using projected future year traffic demands), and then make conclusions based on the modeling results. One drawback of this approach is that there may be concerns about the accuracy of the simulation modeling tool.

As these simulation models become easier to use, it may be practical to use more than one model on some studies. As an example, the authors recently completed work on a study where both CORSIM and VISSIM were applied to a study of design alternatives in Seattle, WA. The two-model approach was selected as a means of making the analysis more reliable, and the results more defensible.

The purpose of this paper is twofold:

- To provide detailed information about recent findings from using these two popular traffic simulation models (CORSIM and VISSIM). Comments are directed largely at the users of these two models.
- To illustrate how practitioners and researchers can and should use multiple simulation modeling packages in their studies. It is the authors' hope that others will use some of these approaches to improve their modeling processes.

The paper begins with a brief discussion of the CORSIM and VISSIM models, and a description of the project where the models were applied. Then, the analysis approach and results are outlined. The findings are summarized in two ways: a technical comparison of the two models, and some more general comparisons believed to be of value to simulation model users. The final section provides some concluding remarks about the models and the process, recommendations to users, and suggested areas of additional research.

## **TRAFFIC SIMULATION MODELS**

### **The CORSIM Model**

CORSIM (1,2,3,4) is a microscopic simulation model designed for the analysis of freeways, urban streets, and corridors or networks. The model includes two predecessor models: FRESIM and NETSIM.

FRESIM is a microscopic model of freeway traffic, and NETSIM is a model of urban street traffic.

CORSIM's capabilities include simulating different intersection controls (e.g., actuated and pre-time signals); almost any surface geometry including number of lanes and turn pockets; and a wide range of traffic flow conditions. CORSIM is based on a link-node network model. The links represent the roadway segments while the nodes mark a change in the roadway, an intersection, or entry points.

CORSIM was developed and is maintained by the Federal Highway Administration (FHWA). It is run within a software environment called the Traffic Software Integrated System (TSIS), which provides an integrated, Windows-based interface and environment for executing the model. A key element of TSIS is the TRAFVU output processor, which allows the analyst to view the network graphically and assess its performance using animation. Version 4.2 of TSIS was used for this study.

### **The VISSIM Model**

VISSIM (5,6,7) is a microscopic, time step and behavior based simulation model developed to analyze the full range of functionally classified roadways and public transportation operations. VISSIM can model integrated roadway networks found in a typical corridor as well as various modes consisting of general purpose traffic, buses, light rail, heavy rail, trucks, pedestrians, and bicyclists. The model was developed at the University of Karlsruhe, Germany during the early 1970s. Commercial distribution of VISSIM began in 1993 by PTV Transworld AG, who continues to distribute and maintain VISSIM today.

VISSIM version 2.91 was used in this study.

The model consists of two primary components: (1) simulator and (2) signal state generator (SSG). The simulator generates traffic and is where the user graphically builds the network. The user begins by importing an aerial photo or schematic drawing of the study area into the simulator. Next, the user begins "drawing" the network and applying attributes (e.g., lane widths, speed zones, priority rules, etc.).

Although links are used in the simulator, VISSIM does not have a traditional node structure. The lack of nodes provides the user with the flexibility to control traffic operations (e.g., yield conditions) and vehicle paths within an intersection or interchange.

The SSG is separate from the simulator. It is where the signal control logic resides. Here, the user has the ability to define the signal control logic and thus emulate any type of control logic found in a signal controller manufacturer's firmware. The SSG permits the user to analyze the impacts of signal operations including, but not limited to: fixed time, actuated, adaptive, transit signal priority, and ramp metering. It is important to note that fixed time control can be implemented in the simulator. The SSG reads detector information from the simulator every time step. Based on the detector information, the SSG decides the status of the signal display during the subsequent time step.

## PROJECT APPLICATION

CORSIM and VISSIM were applied as part of the State Route (SR) 519 (S. Royal Brougham Way) alternative analyses conducted for the Washington State Department of Transportation (WSDOT) in 1999. Figure 1 illustrates the future project study area, which is located in downtown Seattle, just south of the Central Business District (CBD). SR 519 is an east-west arterial that begins at the ferry dock (just west of the study area) and continues to the east. In its current alignment, SR 519 is a two-way, 4-lane (with left-turn bays), at-grade roadway that ends at 4<sup>th</sup> Avenue. In the future, the western terminus of I-90 will become the east end of SR 519. SR 519 and nearby roadways are often highly congested during the peak periods.

WSDOT identified the need for physical improvements to the roadway network to eliminate an at-grade railroad crossing, to improve overall traffic performance, and to accommodate future growth. Initially, many alternatives were generated using different combinations of these options. Ultimately, six were retained for more focused analysis using the simulation models:

- A:** A three-lane alignment on SR 519, prohibiting access to SR 519 from the 4<sup>th</sup> Avenue ramp, and no reversible lanes on Atlantic Street.
- B:** A two-lane alignment on SR 519, prohibiting access to SR 519 from the 4<sup>th</sup> Avenue ramp, and no reversible lanes on Atlantic Street.
- G:** A three-lane alignment on SR 519, prohibiting access to SR 519 from the 4<sup>th</sup> Avenue ramp, with reversible lanes on Atlantic Street.
- H:** A two-lane alignment on SR 519, prohibiting access to SR 519 from the 4<sup>th</sup> Avenue ramp, with reversible lanes on Atlantic Street.
- I:** A three-lane alignment on SR 519, prohibiting access to the Seahawks' garage from I-90, and no reversible lanes on Atlantic Street.

**J:** A two-lane alignment on SR 519, prohibiting access to the Seahawks' garage from I-90, and no reversible lanes on Atlantic Street.

These six design alternatives were analyzed using forecasted 2020 demands during the PM peak period when an event (baseball game) was scheduled. Volumes were adjusted for changes in demand and turning probabilities as required by each alternative.

## **ANALYSIS APPROACH**

The simulation modeling described in this paper was undertaken to help quantify the benefits and impacts of different alternatives. Traffic operations analysis, using simulation modeling, was identified as the best approach for assessing the traffic performance impacts of the various alternatives. Approaches for analyzing the system as a series of intersections were also considered. For example, the *Highway Capacity Manual (HCM) (8)* procedures could have been used to estimate delays at signalized intersections. However, the procedures do not adequately capture the system impacts of long queues and severely oversaturated conditions. Therefore, simulation modeling was identified as the most appropriate tool. This section describes how the simulation models were developed and run to support the analysis.

### **Inputs and Coding**

The first step in the process was to compile the input data needed for the two models. These included supply (geometric components), demand (traffic), and control (traffic signal timing). The input data required for the two models were quite similar, although both models include other features that were not used here.

Once the inputs were reviewed, and a consistent set of data was developed, the study network and design alternatives were coded in both VISSIM and CORSIM. The analysts developing the two models frequently communicated to ensure that the same supply, demand, and control assumptions were used in both models. However, since one goal for this study was to compare the results of VISSIM and CORSIM, the two models were developed independently to allow a fair comparison between the two sets of results.

### **Testing and Validation**

Once the models were completed, the two models were tested and validated. On-screen animation and model outputs were reviewed for reasonableness and coding accuracy. A particular concern was driver behavior in the congested networks. Occasionally, CORSIM driver behavior was observed to be unrealistic (e.g., blocking traffic in the right lane to jump a long queue in the left turn lanes). In other

cases, vehicles got "stuck" for periods of time. In these cases, changes to CORSIM input parameters (e.g., lane alignments, node locations, and driver behavior parameters) were needed.

Then, model outputs were reviewed with WSDOT staff and others familiar with the network. This step served two purposes. First, it provided independent checks of the network and coding to ensure that the two models were accurate and consistent. Second, it provided a professional assessment of the validity of the future traffic demand projections and network performance. During this validation exercise, several improvements to the networks of both models were identified and executed.

### **Model Runs**

Once the validation was complete, a series of model runs and analyses were conducted to analyze the traffic network. To allow for the most robust analysis possible, special care was taken to consider any reason for error or inconsistencies in the results:

- Ten (10) runs were made for each scenario and model. Since both VISSIM and CORSIM are stochastic (random) models, there may be minor differences in the results depending on the random number seed. Averaging the results from multiple runs addressed this issue. The results presented in later sections are the averages for ten runs.
- Different measures of effectiveness were used. A qualitative assessment of each scenario was made by observing traffic (using the on-screen animation provided by both models). Then, comparisons of travel time on specific routes (illustrated in Figure 2) were made. Finally, systemwide measures of effectiveness (e.g., delay, speed) were assessed.
- A sensitivity analysis was conducted, where demands were increased and decreased by 10%. In other words, factors of 1.10 and 0.90 were applied to all demand inputs, and results were analyzed.

A total of 180 runs were made with each model. There were six design alternatives, and ten model runs were conducted for each. With the sensitivity analysis, each set of alternatives was analyzed three times with varying demand assumptions.

Outputs from the two models were extracted into spreadsheets, so direct comparisons could be made between the two models and among the various design alternatives. Findings from the comparisons of the alternatives were communicated to WSDOT. For this paper, however, the more relevant findings are the comparison between the models and the lessons learned in the process. These findings are provided in the following section.

## **FINDINGS**

This section is divided into three parts. The first part is a general comparison of the two models. The second is a quantitative comparison of the results from VISSIM and CORSIM. The last part is a summary of recommendations for other modelers, based on the successes (and obstacles) in this work.

### **General Comparison of the Two Models**

There are occasional studies that provide a comprehensive summary of model families and individual packages (2), but direct comparisons of applications of specific models are difficult to find in the literature; references (3), (9), and (10) are examples. Much is learned about these models with direct comparisons, and it is hoped that the findings documented here will help to advance the knowledge of both models.

In general, CORSIM and VISSIM have similar structures and capabilities. There are, however, some distinct differences that are noteworthy: (1) network coding process, (2) car-following logic, (3) gap acceptance, (4) modeling of signals, (5) animation features, and (6) output data.

#### *Network Coding Structure*

The network coding process is different between the two models. CORSIM uses a link-node structure. The user defines the location and attributes of nodes (e.g., intersections), and the nodes are connected with links. The user then assigns attributes (e.g., turn movement percentages speeds, lane configurations, traffic control devices, etc.) to the links and nodes.

VISSIM networks, on the other hand, eliminate the use of nodes and rely on links and connectors to build a network. Networks are graphically built over a background map (i.e., aerial or base map) of the study area thus allowing the user to match the network geometry (e.g., curvature) to field conditions. Links are used to define the width and number of lanes for a given roadway segment. The connectors are then used to connect the links at intersections enabling the user to control vehicle paths in an intersection. Next, traffic compositions are defined by the user and attributes assigned to the links and connectors.

#### *Car-Following Logic*

The car-following model in CORSIM sets a desired amount of headway for individual drivers (there are ten user-definable driver types) corresponding to a specific amount of headway. Within the constraints of traffic control devices and other system elements, vehicles seek to maintain a minimum car-following distance while not exceeding their maximum speed.

CORSIM uses an interval-based simulation approach, moving every vehicle (represented as a distinct object) and updating each traffic signal every second. When a vehicle is moved, its position (both lateral and longitudinal) on the link and its relationship to other vehicles nearby are recalculated, as are its speed, acceleration, and status.

VISSIM uses the psycho-physical driver behavior model developed by Wiedemann (5) in 1974. The basic concept of this model is that the driver of a faster moving vehicle starts to decelerate as he reaches his individual perception threshold to a slower moving vehicle. Since he cannot exactly determine the speed of that vehicle, his speed will fall below that vehicle's speed until he starts to slightly accelerate again after reaching another perception threshold. This results in an iterative process of acceleration and deceleration.

VISSIM, like CORSIM, uses an interval-based simulation approach. VISSIM simulates traffic flow by moving "driver-vehicle units" through a network. Stochastic distributions are used to replicate individual driver-vehicle unit behavior and dynamic headway. Every driver with his specific behavior characteristics is assigned to a specific vehicle.

#### *Gap Acceptance*

The ten driver types in CORSIM are assigned variable gap acceptance parameters for permissive left-turns, right turn on red, and other gap acceptance situations. Each gap acceptance decision is independent; made by an individual driver considering the current available gap and a personal gap acceptance value.

Gap acceptances in VISSIM is user-definable and location specific. Therefore, gap acceptance can vary from one point to another with a particular network based on the type of operations being simulated (e.g., permitted left turns, right turns on red, U-turns, and all-way stop control). Gap acceptance can also be varied by vehicle type. VISSIM provides an unlimited number of user-definable vehicle types.

#### *Signal Control*

Both CORSIM and VISSIM can model nearly any realistic signal control system. Both models also can interface with external control devices either through interfaces to physical traffic signal controllers or control algorithms residing in external software programs. However, the models differ somewhat in how actuated control is coded. CORSIM uses the "card" structure required for all of its input data, while VISSIM provides an external signal state generator that allows the user to custom define the control algorithm to be modeled.

### *Animation Features*

CORSIM and VISSIM both allow the user to create animation files. At the same time that it is simulating the traffic in the network, CORSIM creates an animation file. The animation file is viewable once the entire study period has been simulated. VISSIM allows the user to view the on-screen animation as the animation file is being created.

### *Output*

Numerous types of output data are available from both models. VISSIM allows the user somewhat more flexibility to specify where and what type of data is to be collected. Of course, allowing the user to control the reported output data provides flexibility, but requires more coding effort than when it is automatically generated by the model. Another important difference between the models is the measurement of travel time. CORSIM generates travel times for each link (turn-specific travel times can be generated) which can be aggregated to determine travel time for a particular route. Within VISSIM, travel time routes are specified between two points. All vehicles crossing those two points are captured in the travel time output.

### **Comparison of Results**

A comprehensive quantitative analysis of the VISSIM and CORSIM outputs for the SR 519 study was conducted. This was done using two performance measures: route-specific travel time and system travel time. Also, three statistical analyses were undertaken to compare the two models: travel time sensitivity analysis, *t*-tests for travel time differences and throughput.

### *Route-Specific Travel Time*

Route-specific travel time was used to compare predicted travel times from specific routes (i.e., 1, 2, 3, etc.) for various scenarios (i.e., A, B, G., etc.) for the two models. Forty-two (42) comparisons were made, and there was only one case where the difference in travel time between the two models was more than forty percent (40%). Thirty-three (33) of the comparisons were within twenty percent (20%). Also, VISSIM and CORSIM were found to agree on whether or not the travel times are significantly higher for the 2-lane scenario.

### *System Travel Time*

Figure 3 is comparison of the total travel time for six routes (1, 2, 4, 5, 6, and 7) for each scenario. These six routes represent a range of typical trips in the network, so adding up the travel time may be a

reasonable measure of the relative system traffic performance of each scenario. Note that VISSIM and CORSIM are consistent in suggesting that the total travel for the 3-lane scenarios (A, G, and I) is about ten minutes less (one to two minutes per trip) than the travel time for the 2-lane scenarios. Also, note that the CORSIM runs suggest that scenario G has the lowest travel time, while the VISSIM results indicate that scenarios A and G are the lowest. Overall, CORSIM travel times are 9% greater than VISSIM, although the difference ranges from -8% to 18%, depending on the scenario.

#### *Travel Time Sensitivity Analysis*

Figures 4 and 5 present the results of a sensitivity analysis for the scenario comparisons (for CORSIM and VISSIM, respectively). To test the sensitivity of the results to demand changes, two additional sets of simulation runs were completed. One set of runs used traffic demands 10% higher than the base case (110% demand). The other set used traffic demands 10% lower (90% demand). Figures 4 and 5 suggest that travel times are sensitive to the level of traffic demand, as would be expected. Also, it suggests that the relative comparisons between the scenarios are consistent even with higher or lower traffic demands.

It is also illustrative to compare the relative travel times predicted by the two models under the sensitivity analysis conditions. In Table 1, the system travel time values (i.e., total travel time for routes 1, 2, 4, 5, 6, and 7) were scaled to 100. The best alternative (i.e., that with the lowest system travel time) scored 100 while the others were given a relative score using the ratio of the travel times. For example, if the fastest total travel time was 30 minutes, that scenario was given a score of 100. Then, if another scenario had a total travel time of 40 minutes, that scenario would be given a score of  $100 * 30/40 = 75$ . The best (highest scoring) alternatives are highlighted in black; the worst are in white.

The CORSIM results suggested that Scenario G is superior, regardless of the demand level chosen. VISSIM, however, indicated the Scenario A is (marginally) preferable to Scenario G with demand levels of 100% or 110%. It agrees with CORSIM at the 90% demand level. Another important note is the degree of difference. If only CORSIM results were available, one might conclude that Scenario G is far superior (travel times are 15 to 20% lower). With the VISSIM results, however, it is not clear whether Scenario A or G is superior.

However, the models were consistent in suggesting that Scenarios I and J would result in higher travel times, and that the 3-lane scenarios (A, G, and I) were clearly superior. The sensitivity analysis confirmed these results by demonstrating the same conclusions were reached at the 110% and 90% demand levels.

### *Statistical Analysis of Travel Time*

Beyond the analyses for the SR 519 project, statistical analyses were conducted to identify how well the results matched between CORSIM and VISSIM. A paired  $t$ -test was applied to further compare the travel times. Here, the  $t$ -test was designed to test whether the two models report significantly different travel time values for the same routes. The difference in travel time for each of the 42 available comparisons was first computed. Next, an average ( $d = 46.5$  seconds) and standard deviation ( $sd = 135.5$  seconds) were computed for those differences. Using an alpha of 0.05 and a two-tailed test, the  $t_{0.025,41}$  was found to be 2.021. The calculated  $t_{\text{paired}}$  value is 2.240. Since  $t_{\text{paired}}$  is greater than  $t_{0.025,41}$ , the data suggests that the travel times reported by CORSIM and VISSIM are significantly different for the alpha of 0.05.

Great care was taken to make sure that the networks were coded identically in the two models, so it is suspected (although not proven) that there are some differences in the internal logic of the two models, at least for modeling congested conditions. However, since travel time is a high-level measure, there is not enough information from this study to speculate on specific differences or causes.

### *Throughput*

To further compare CORSIM and VISSIM, a section of roadway was analyzed to compare the throughput volume. A 280-foot section of Royal Brougham was selected for this comparison in Scenario A. The section consisted of three westbound lanes located approximately 380 feet upstream from the stop line at 1<sup>st</sup> Avenue. Similar values for saturation flow rates (approximately 1800 vehicles/hour/lane) and start-up lost time (two seconds) were used for both models.

The results of 10 simulation runs are reported in Table 2. The volumes are recorded over a 48-minute interval.

VISSIM and CORSIM, on average, reported similar throughput across this particular section. VISSIM's throughput was approximately one percent greater than CORSIM's. The variability among the runs, however, was greater for CORSIM than VISSIM as measured by the standard deviation.

### **Recommendations for Traffic Modelers**

The authors have worked on a wide range of projects and studies where traffic simulation models have been applied. This experience, plus reviews of others' work, has suggested that there is a wide range of approaches used when applying simulation models. This leads to the conclusion that it may be appropriate to develop recommendations for applying these tools to traffic analyses. A full treatment is

beyond the scope of this paper, but some general comments are provided here, based on the successes (and obstacles) in the SR 519 study. Following these general comments are some more broad recommendations regarding the selection of an appropriate simulation model.

### *Using More Than One Model*

It was clear that the analysis was considerably strengthened by using both CORSIM and VISSIM. This conclusion was reinforced by findings throughout the project. For the analysts, it resulted in more accurate models. Since the models were applied to a highly congested system, when simulation models may be less accurate, it was helpful to compare the results. Once the findings were presented to WSDOT and its project partners, the two-model approach gave confidence that the models were accurate. When presented with results from a simulation model, many often have a degree of skepticism. This natural reaction can be addressed (at least in part) with the two-model approach.

Of course, resources (time, money, or experience) do not always permit the use of multiple models. It is hoped that similar studies will be conducted that highlight where specific simulation models might perform well (e.g., on oversaturated urban streets). This will allow those using just one particular model to have more confidence in their results.

### *Model-Specific Knowledge*

It goes without saying that analysts should have a strong technical knowledge of the simulation models being used. For the work described here, this was particularly important. Since the system was severely congested, minor changes to the CORSIM and VISSIM input files often had a significant impact on the results. In particular, detailed knowledge of the following was found to be critical:

- Factors affecting lane selection: Congested conditions are exacerbated by vehicles who bypass the back of a queue in their desired lane and then stop in another lane and wait to join the queue. In both CORSIM and VISSIM it is possible to minimize this behavior with appropriate model coding techniques. In CORSIM, lane channelization, turning bay, lane alignment, and lane-change parameters may impact lane selection. In VISSIM, a critical factor is the connections between links.
- Actuation: Many of the signals in this network were actuated. Both CORSIM and VISSIM provide comprehensive features for modeling actuation, but these parameters are complex to code. Also, careful attention is needed to ensure that the detectors in both models are coded correctly.

### *Multiple Performance Measures*

Often, a single performance measure (e.g., delay or speed) is used to draw conclusions from a study. For the SR 519 analysis, multiple performance measures were used. System measures were supplemented by

user-specific measures (e.g., travel time on specific routes). Evaluation using multiple measures was found to be superior for three reasons:

- Different models may have different ways of producing results. For example, control delay (at a signal) is measured differently, depending on the model.
- Multiple measures provided more confidence when comparing alternatives (i.e., demonstrating that more than one performance comparison suggested a superior alternative).
- Different stakeholders have different interests (e.g., access to a particular garage), while others have system views (e.g., WSDOT wanted to maximize overall system performance).

### *Sensitivity Analysis*

It was clear that the sensitivity analysis was a valuable part of this analysis. Again, it provided confidence to everyone that the results are consistent and reasonable. The sensitivity analysis added another facet to the comparison process: more than one model was developed, more than one performance measure was applied, and more than one set of demand assumptions was considered. **CONCLUSIONS**

Due to the complexity and system implications of many proposed design alternatives, simulation modeling is a logical approach as an analysis tool. There may be those who are cautious or skeptical about the application of a complex program to make a critical design decision. This concern is often appropriate, as many models are unproven or there is little information available about their accuracy.

This paper described an approach, using two simulation models, that worked especially well. The results proved the general consistency and reasonableness of the simulation tools under congested arterial street conditions, and provided everyone involved with confidence about the analysis. Specifically, in regard to simulating the SR 519 study area with CORSIM and VISSIM, the following conclusions were made:

- Relative travel times were consistent between the models and lead to the same conclusions about the design options analyzed in this study. However, there were differences in the absolute predictions of the two models for some scenarios.
- Both models are appropriate for modeling congested arterial street conditions.
- Although the parallel modeling effort added credibility to the analysis results, either model alone was adequate for the analysis. A specific model cannot be recommended based on this research – both were appropriate for this study. Each has specific strengths and limitations that should be evaluated on a case-by-case basis.

- On a selected section upstream of a signalized intersection, both models produced similar throughput.
- It is estimated that coding the SR 519 network took approximately the same amount of time in CORSIM and VISSIM.

This study also illustrated the value in using a range of performance measures, and a sensitivity analysis. More generally, it proved the value in providing as much comparative information as possible before making a design decision. In this case, data were available from two models, for multiple performance measures, and for a range of demand scenarios. The results were generally consistent, and the end product was a set of clear, defensible, and well-supported conclusions about the performance of the design alternatives.

### **FURTHER RESEARCH**

For the most part, simulation model comparisons have been performed at a very high level where only the features among the models are compared. In some instances, professionals perform the comparisons with little knowledge or detailed experience with the simulation models being compared. Although the effort presented in this paper provides a more detailed comparison, it still remains a relatively broad comparison between two models as they are applied to one network. The lack of detailed comparisons provides an opportunity for further research. Some of the areas that appear ripe for further comparative research include:

- More statistically rigorous comparisons among a wide variety of models applied (a) to the same network and (b) to roadways of different functional classifications;
- An analysis of the number of runs needed to achieve results within a given confidence interval;
- Comparisons of the two models to field data;
- A sensitivity analysis of performance measures (e.g., delay, travel time, etc.) based on varying (a) demand volume levels and (b) traffic compositions; and
- A document summarizing comparison of the internal logic (e.g., car-following, lane change, and gap acceptance) of the models.

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**TABLES WITH TITLES**

TABLE 1 SENSITIVITY ANALYSIS COMPARISON

Scenario	VISSIM Demand Level			CORSIM Demand Level		
	100%	90%	110%	100%	90%	110%
G (3 lanes, reversible lane)	98	100	94	100	100	100
A (3 lanes, I-90 garage access)	100	90	100	82	84	82
H (2 lanes, reversible lane)	87	85	76	81	78	87
B (2 lanes, I-90 garage access)	82	70	80	69	68	71
I (3 lanes, no I-90 garage access)	81	70	76	67	64	71
J (2 lanes, no I-90 garage access)	71	63	68	57	56	59

(values in table reflect relative performance; 100 is best)

TABLE 2 LOCAL COMPARISON OF THROUGHPUT (VOLUME/48 MINUTES)

Run	VISSIM	CORSIM
	$m_v$	$m_c$
1	1006	901
2	996	1016
3	1004	966
4	987	961
5	995	995
6	1008	984
7	991	958
8	990	1022
9	951	1051
10	1018	980
Average	995	984
Std. Dev.	18	42
Avg. % difference	1.1%	

**FIGURES**

**FIGURE 1**  
Future Project Study Area

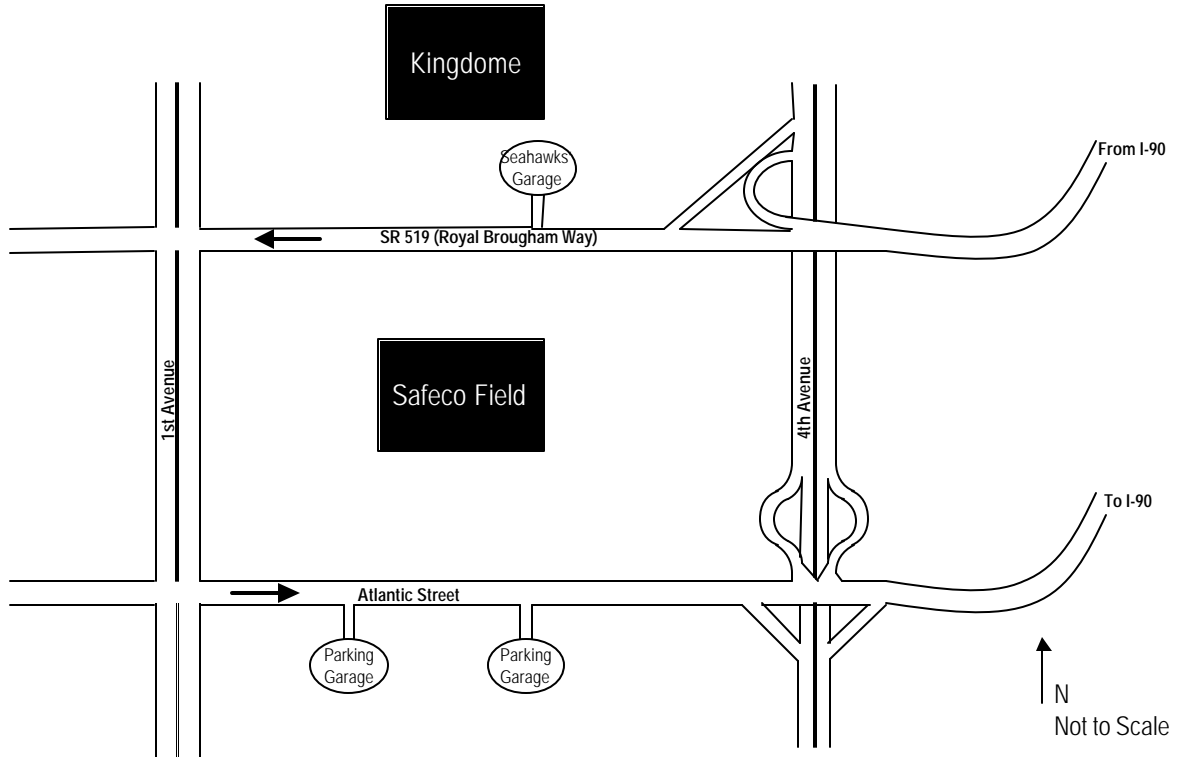
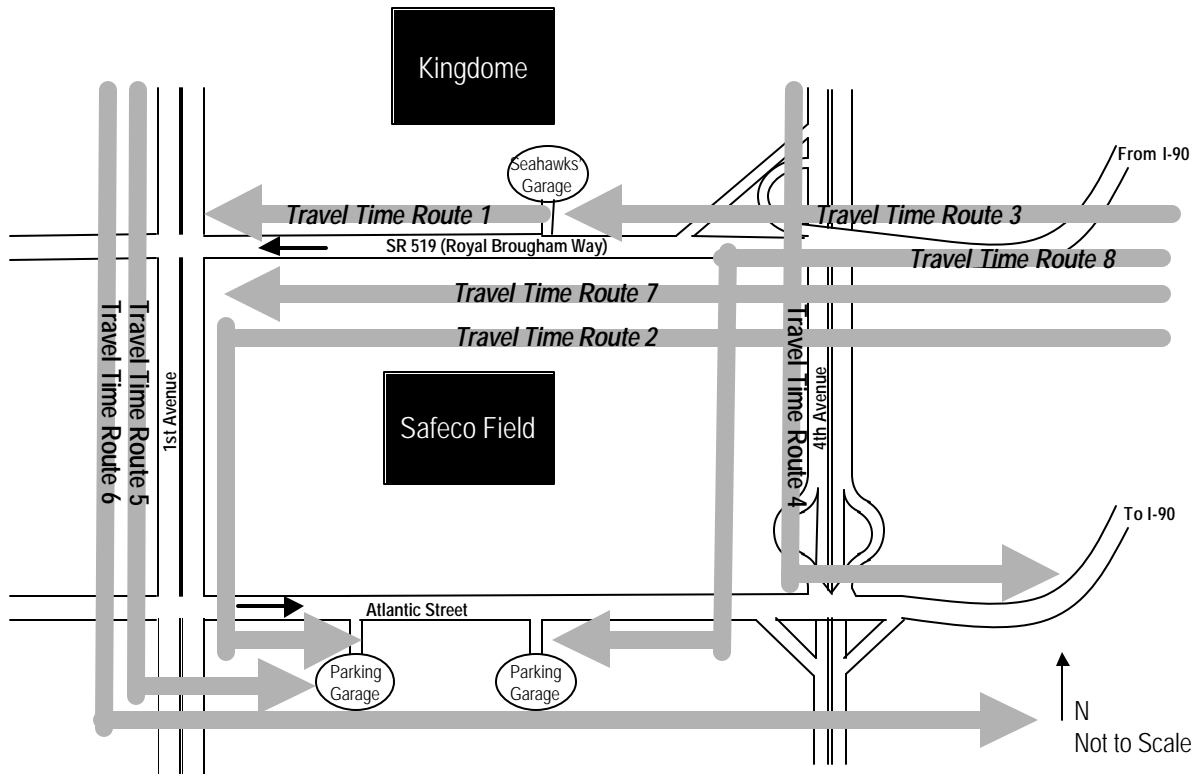


FIGURE 2  
Travel Time Routes



**FIGURE 3**  
Travel Time Comparison for Selected Travel Time Routes

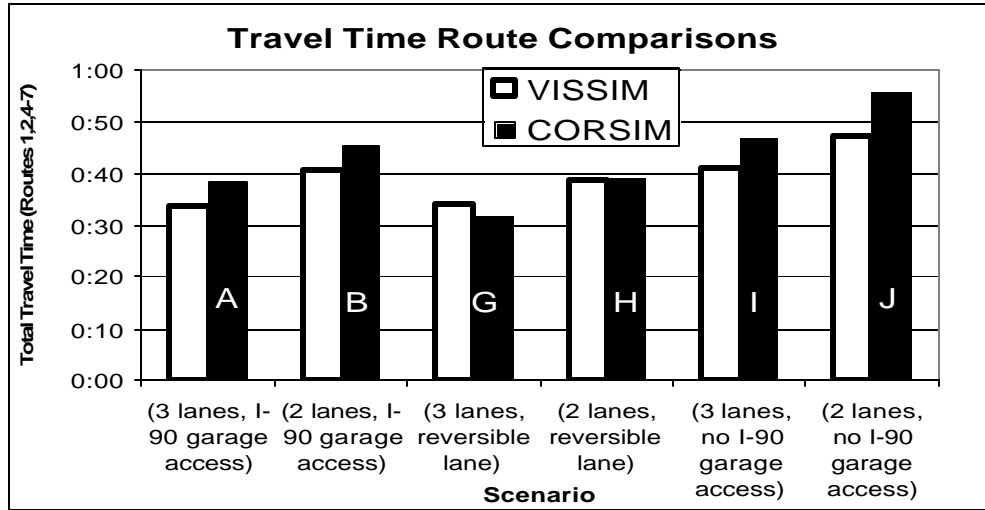


FIGURE 4  
CORSIM Sensitivity Analysis

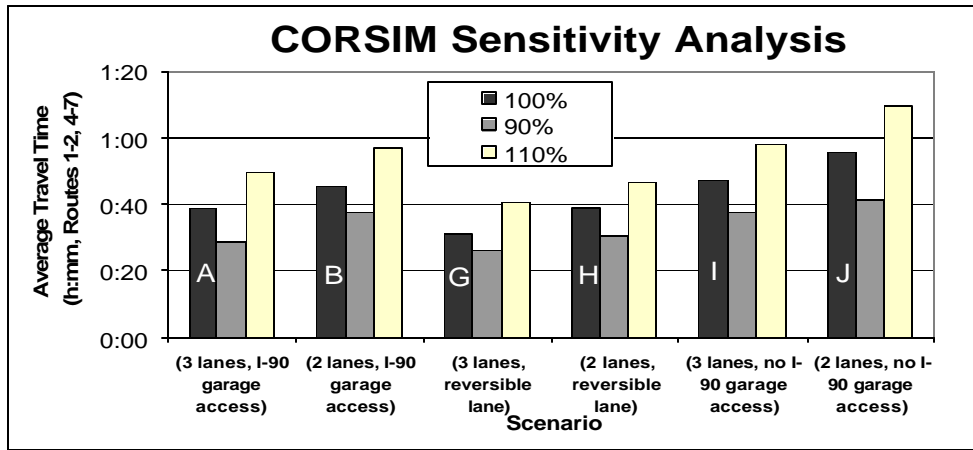
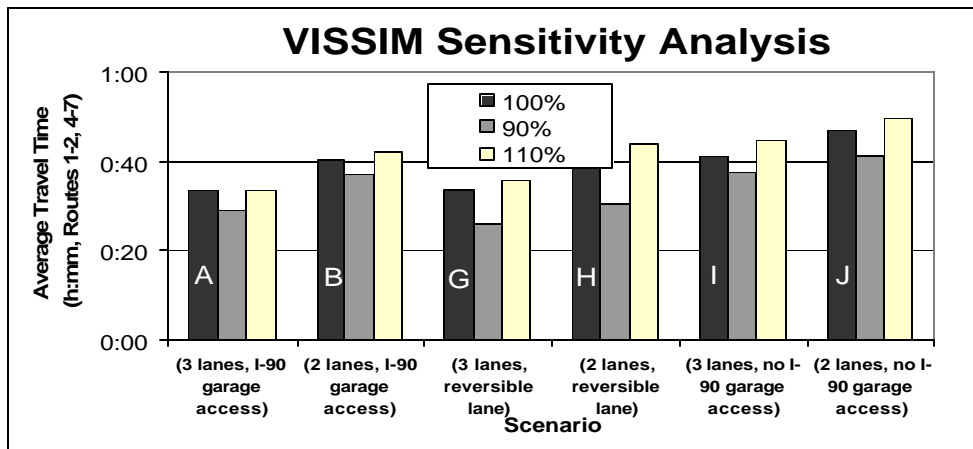


FIGURE 5  
VISSIM Sensitivity Analysis



## **Table Titles and Figure Captions**

**TABLE 1**

Sensitivity Analysis Comparison

**TABLE 2**

Local Comparison of Throughput (Volume/48 minutes)

**FIGURE 1**

Future Project Study Area

**FIGURE 2**

Travel Time Routes

**FIGURE 3**

Travel Time Comparison for Selected Travel Time Routes

**FIGURE 4**

CORSIM Sensitivity Analysis

**FIGURE 5**

VISSIM Sensitivity Analysis