CO Florida 2024

User's Guide

FDOT Intersection Air Quality (CO) Screening Model

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ABSTRACT

This model, CO Florida 2024 (COFL2024), replaces CO Florida 2012 (COFL2012), the previous version of Florida's carbon monoxide (CO) screening model for intersections. It updates the screening model to incorporate emission factors produced from the U.S. Environmental Protection Agency's (EPA) motor vehicle emission simulator (MOVES) version 4. The update to COFL2024 addresses many problems and migrates the codebase to the latest version of Visual Basic. This update optimized the code for compatibility with modern industry standards, and enhanced overall performance and maintainability. The team also modernized source code management by migrating to GitHub, a professional platform that facilitates code storage, management, distribution, and documentation. A total of 574 MOVES runs were performed to generate updated emission rates for two roadway types, including a missing roadway type that was not accounted for in the original COFL2012 software. This air quality screening model was developed under research performed for the Florida Department of Transportation (FDOT). This User Guide gives detailed instruction as to how to use the model; a more complete discussion of the theory and practice of screening models is included in the Final Report of this project.

COFL2024 quickly and easily analyzes intersections and other similar facilities in the state of Florida for possible exceedances of the ambient CO air quality standards. As a screening model, COFL2024 incorporates conservative assumptions including peak hour traffic, January time-frame temperatures, worst-case meteorology (wind speed, stability class, and wind angle search), and very close-in receptors. The use of are many built-in values of parameters saves the user considerable time and effort in conducting the analysis. The philosophy of a screening model is that if these worst-case assumptions do not produce an exceedance, then none of the normal conditions encountered during the year will either. COFL2024 runs in Windows and incorporates curve-fit equations of emission factors developed from numerous runs of MOVES. This avoids having to run MOVES from within the screening model and thus allows for easier updates in the future. COFL2024 also has a CAL3QHC module built into it, with all the different intersection configurations, pre-programmed as separate input files, just waiting for insertion of certain specific inputs that come from the data the user enters or the choices that the user makes. COFL2024 runs very quickly, and the Windows-based environment allows for easy operation of the model as well as easy file management.

The Air Quality Lab and the Air Pollution Modeling and Control Research Group at the University of Central Florida (UCF) gratefully acknowledges the Florida Department of Transportation (FDOT) Office of Environmental Management and the cooperation and support of Catherine Bradley (State Environmental Development Engineer), Neil Campbell (Project Development Engineering Specialist and Project Manager), and Terri Cook (Senior Environmental Program Analyst and Co-PM) for their patience and providing guidance during this research to develop this latest version of the CO Florida screening model. We also acknowledge the work of Ms. Debra

K. Keely on CO Florida 2004, which served as an organizational framework, sourced all the Florida images incorporated into the model, and provided many link coordinates for the EPA's preferred near-road dispersion model, CAL3QHC2. These link coordinates were utilized and transcribed into various new roadway configurations. The original COFL model (COFL2012) was developed in 2012 for the Environmental Management Office of the FDOT at the University of Central Florida (UCF) by Dr. C. David Cooper and Mark Ritner, EI. Mariano Berrios was the FDOT Project Officer. COFL2012 was updated by Erik Cornelison and Dr. Haofei Yu at UCF. Catherine Bradley, Neil Campbell, and Terri Cook are the FDOT Project Officers.

INSTALLATION INSTRUCTIONS

Computer Requirements

COFL2024 has been created to run on Windows XP, Vista, and Windows 11 operating systems. The program requires that the .net Framework 6 is installed (already part of most modern computers). If COFL2024 installs, but will not run, please install .net Framework 6[1].

Installation

Download the COFL2024 Screening Model setup file from the FDOT website[2]. Once the file has been downloaded, you can simply double-click on the file *COFLsetup.exe* and it will install directly to your computer. Alternatively, click the Start button, then go to Run. Locate the installation file *COFLsetup.exe* using the Browse button or type in the drive plus *COFLsetup.exe*.

Un-install

The COFL2024 setup program includes an un-install component. Later, if you wish to un-install COFL2024, click on the un-install icon in the COFL2024 program folder, under the Windows Start menu. Be sure that COFL2024 is shut down prior to attempting the un-install. After running the un-installer, delete the COFL2024 folder from the C: drive (or other location chosen during installation.)

[1] This software (.net Framework 6) is available for a free download directly from Microsoft at: https://dotnet.microsoft.com/en-us/download/dotnet-framework

[2] FDOT, *Office of Environmental Management, Engineering Resources.* https://www.fdot.gov/environment/oem-divisions/eng/engineering-resources

INTERFACE CONTROLS

The input screens have been designed for rapid data entry. Users can navigate in three ways: Lower navigation buttons, making a selection, and upper navigation icons and are detailed below.

Lower Navigation Buttons

Each of the user input screens have a grey "Start", "Next" or "Previous" button in the lower section of the screen, shown in **Figure 1**. The simplest way to navigate through the data input screens is to click on these navigation buttons. Note that if no "Next" button is shown, a selection must be made to proceed to the next screen (**Figure 2**; see next section).

Figure 1 Project Description Screen

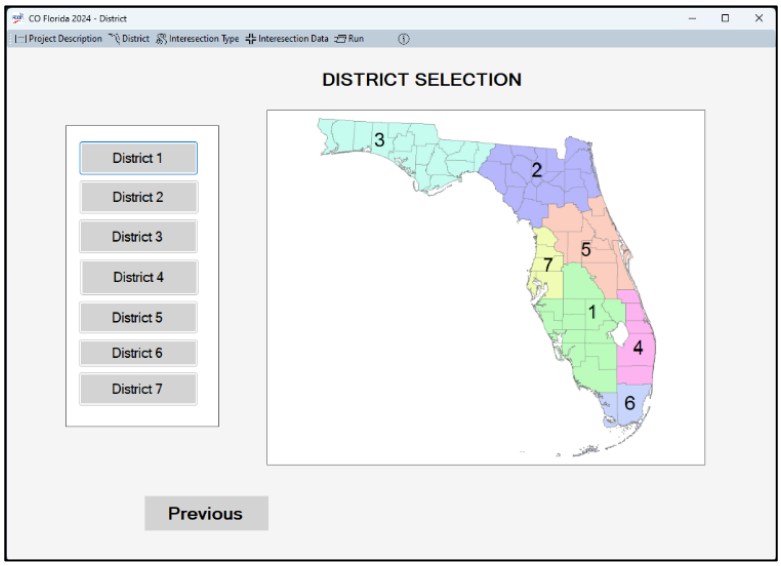

Figure 2 District Selection Screen

Making a Selection

On the "District" (**Figure 2**) and "Intersection Type" (**Figure 3**) user input screens, to advance to the next input screen in sequence, a selection must be made, as a "Next" button is not available.

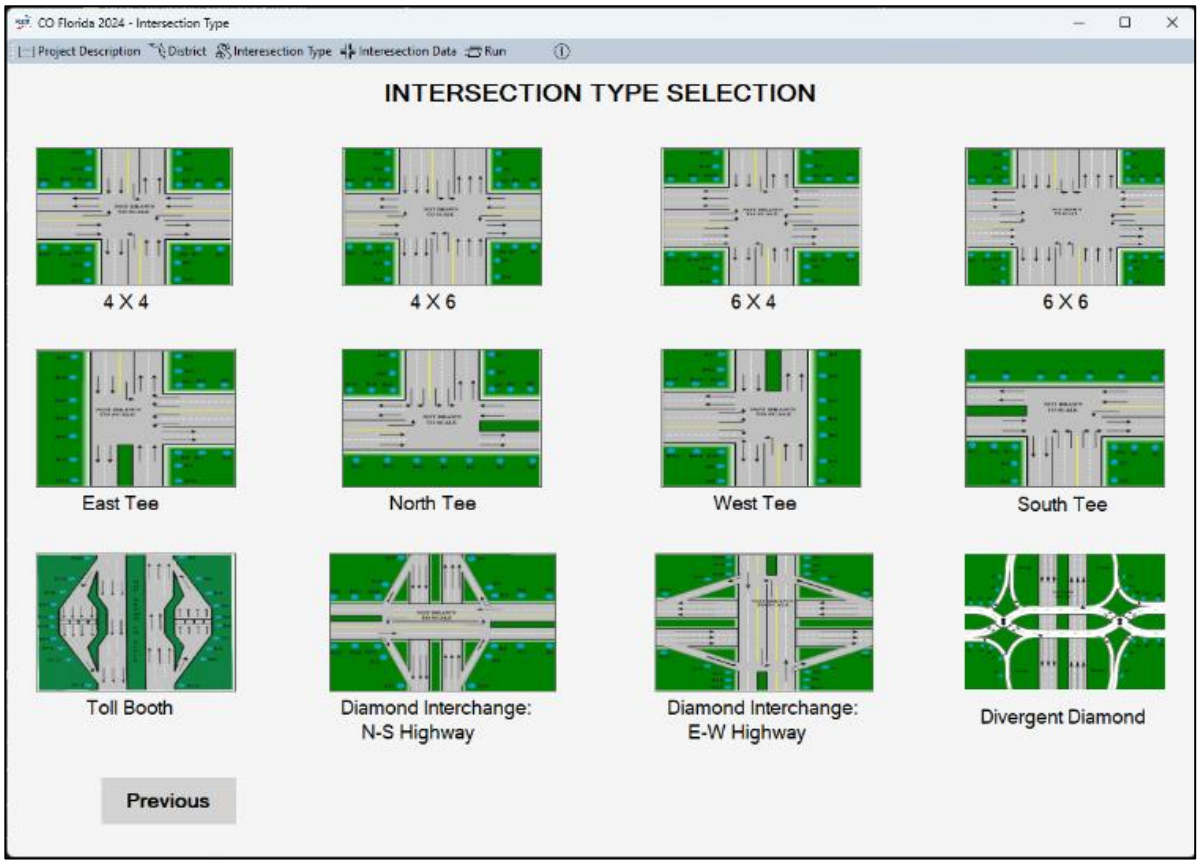

Figure 3 Intersection Type Selection

Upper Navigation Icons

It is also possible to navigate COFL2024 using the five upper navigation icons, shown in **Figure 4**. These navigation icons toggle between the "Project Description", "District", "Intersection Type", "Intersection Data", and "Run" screens. Note that it is only possible to navigate forward once the preceding screens have been completed.

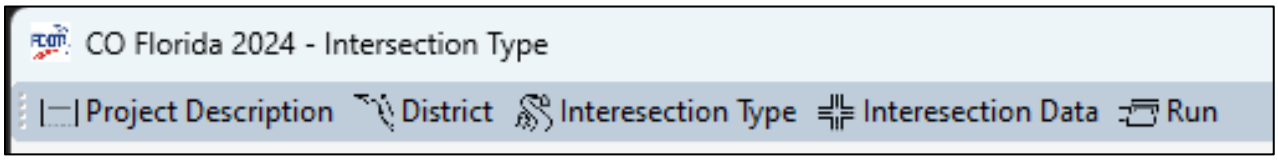

Figure 4 Upper Navigation Buttons

WELCOME SCREEN

The COFL2024 Screening Model opens with the splash screen shown in **Figure 5**. When the user clicks on the "Start" button, the program advances to the **Project Description** Screen (see **Figure 7**).

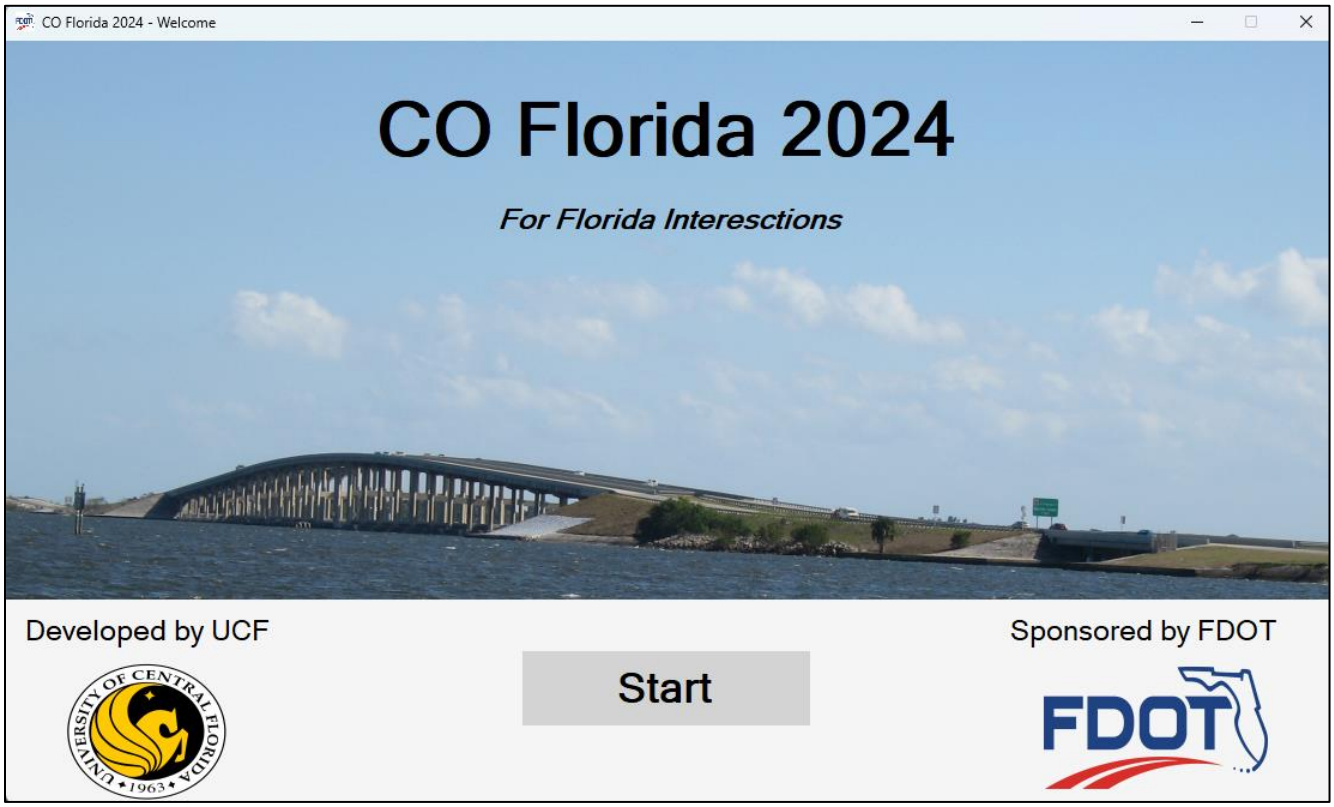

Figure 5 Welcome Screen

ABOUT SCREEN

The  and  icon buttons bring up the "About CO Florida 2024" screen, shown in **Figure 6.**

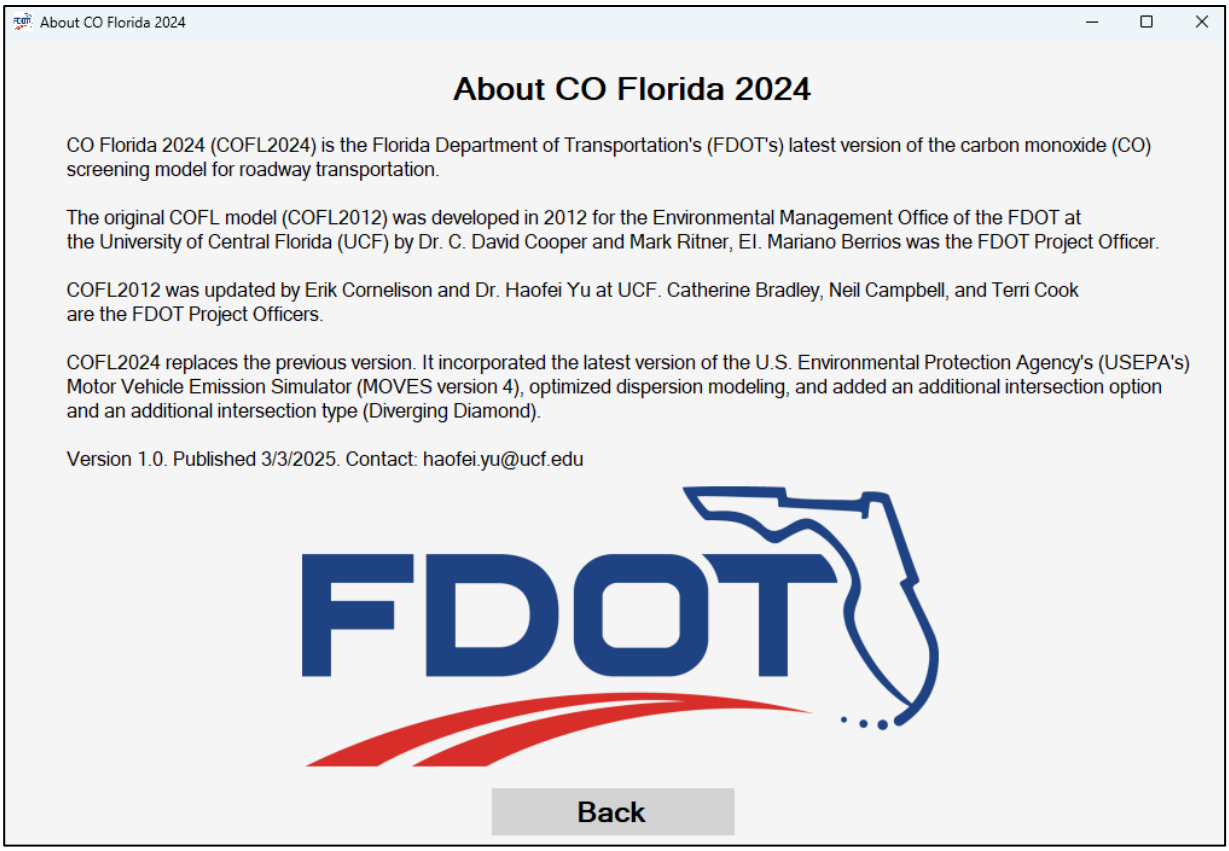

Figure 6 About Screen

PROJECT DESCRIPTION

The **Project Description** screen (**Figure 7**) consists of the upper navigation icon bar, five data entry text boxes, and a group box containing land use type selection buttons. The cursor can be advanced between the text input boxes by the use of the "Tab" key. Any attempts to navigate forward within the model will not be allowed until all fields on this screen have been appropriately completed. Please note that the "Project Title" and "Run Name" fields are restricted to a maximum of 40 characters, to accommodate the CAL3QHC2 input file requirements.

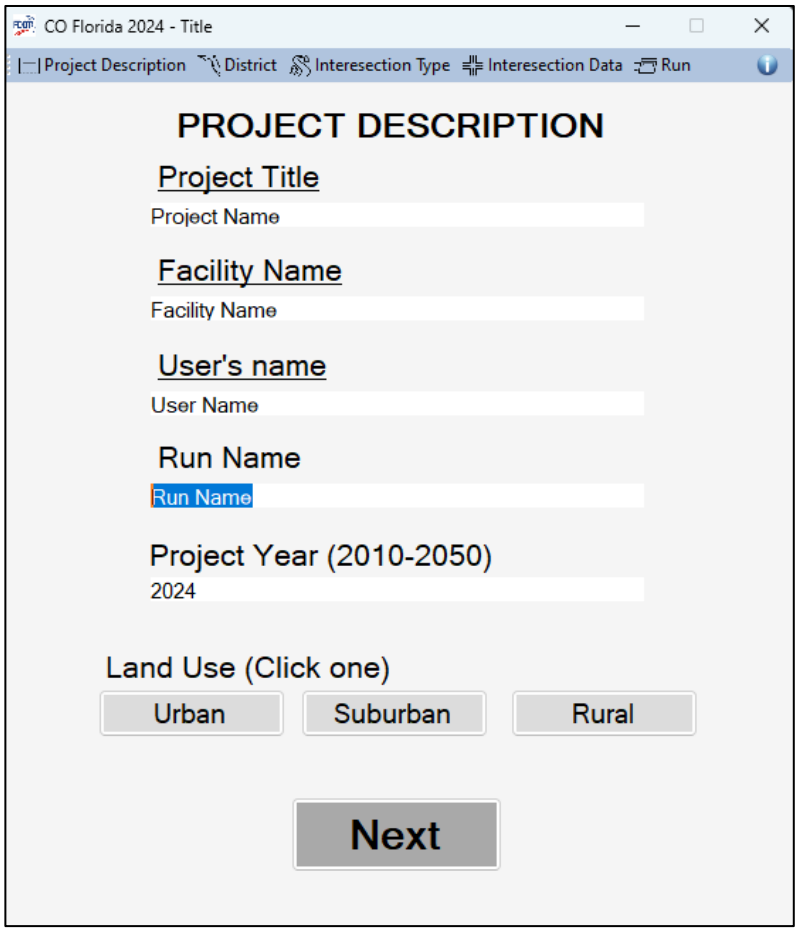

Figure 7 Project Description

The following data fields require data entry:

- Project Title: This field can accept a maximum of 40 characters.
- Facility Name: This field does not have a maximum character limit.
- User's Name: This field does not have a maximum character limit.
- Run Name: This field can accept a maximum of 40 characters.

- Project Year: The model is valid for project years from 2010 to 2050.

- Land Use Type: Select the appropriate land use type - urban, suburban, or rural. The choice of this parameter automatically selects the surface roughness coefficient and atmospheric stability which are inputs in the CAL3QHC2 dispersion modeling program. The land use selection also determines the background CO concentrations which are figured into the final results. **Table 1** lists the land use options and their corresponding surface roughness coefficients, atmospheric stabilities and background concentrations.

Table 1 Parameters Impacted by Land Use Type

Land Use Type	Surface Roughness (cm)	Atmospheric Stability Class	CO Background Concentration (ppm)	
			1-hour	8-hour
Urban	175	D	5.0	3.0
Suburban	108	D	3.3	2.0
Rural	10	E	1.7	1.0

Once the **Project Description** screen has been completed, navigation to the next input screen, the **District Selection** screen, may be made in one of the following ways:

1. Clicking on the "Next" button on the bottom/right of the screen, or
2. Clicking on the "District" icon, shaped like the state of Florida, on the upper navigation bar.

DISTRICT SCREEN

This **District Selection** screen (as shown in **Figure 8**) is used for identifying the Florida Department of Transportation (FDOT) district in which the project is located. The district is selected by clicking on the appropriately named district button inside the group box on the left of the screen. Once a district is selected, navigation to the next input screen, the **Intersection Type** screen, is automatic.

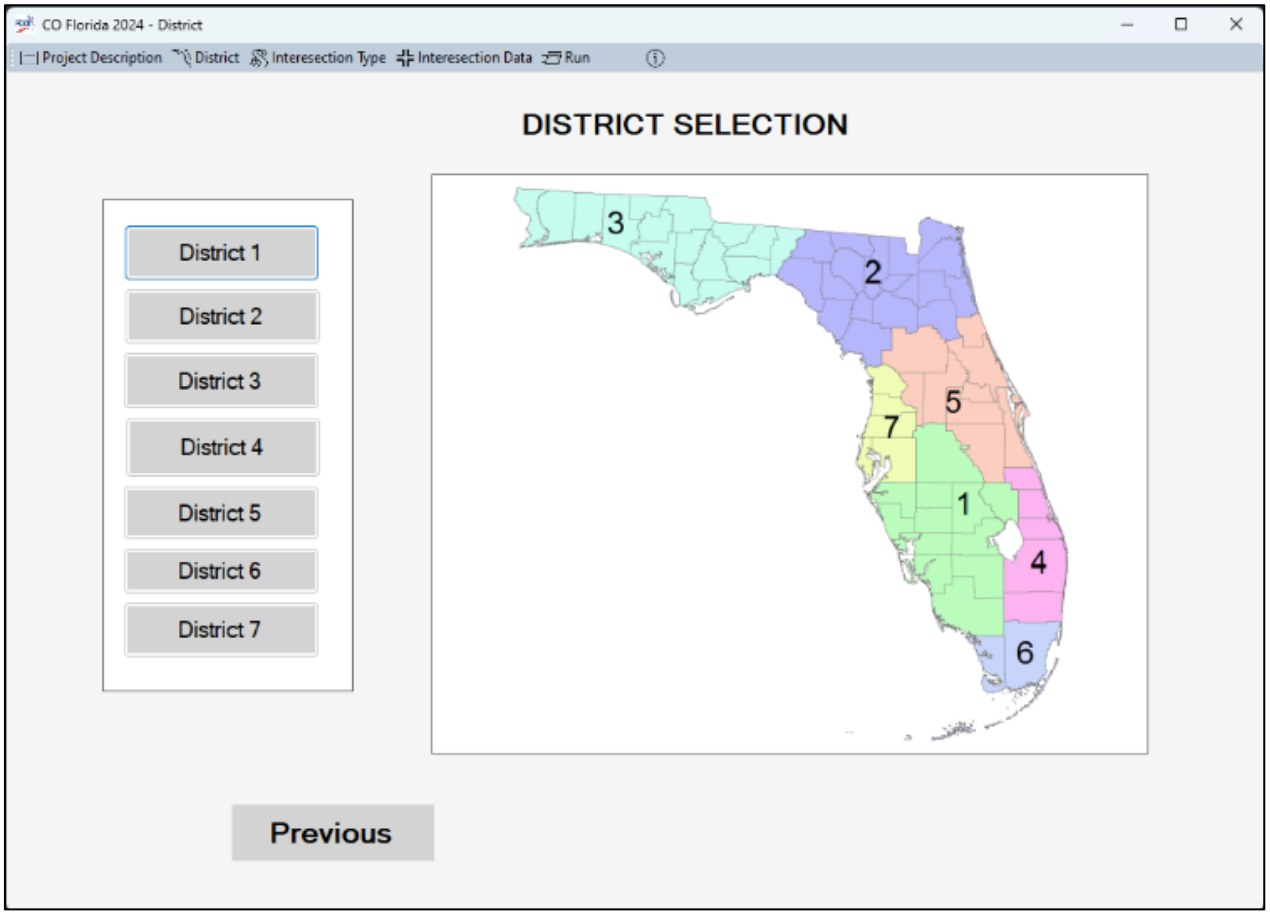

Figure 8 District Selection Screen

INTERSECTION TYPE SCREEN

The user may choose from 12 intersection types as displayed in **Figure 9**. The layout that most closely represents the current roadway project should be selected. The **Tollbooth** screen will offer an east-west orientation and a north-south orientation by clicking on the graphic once it appears. COFL2024 contains pre-built files depicting the geometry and signal timing of each intersection type.

Once the **Intersection Type** screen has been completed, navigation to the next input screen, the selected **Intersection Data** screen, is automatic.

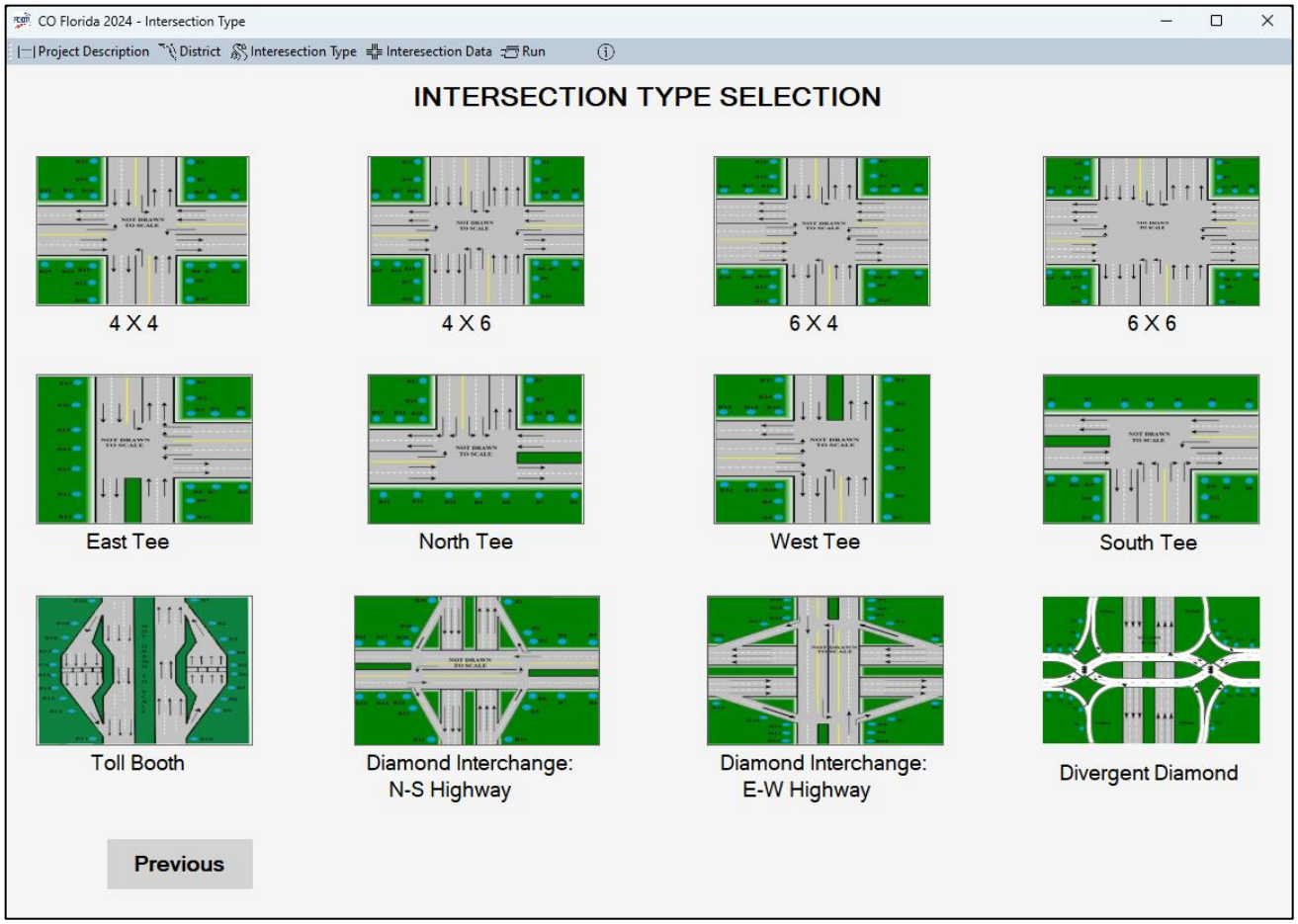

Figure 9 Intersection Type

INTERSECTION DATA SCREEN

The 12 intersection configurations fall into four general categories, each with slightly different data input requirements. Each configuration has its own data input needs and corresponding figure (as seen in thumbnail size in **Figure 9**). The appropriate figure is shown in each of the three examples that follow. For each configuration, the top of the screen is referenced as north.

- Standard, arterial road intersections (e.g. 4 X 4 Intersection),
- Freeway diamond interchanges (e.g. N-S Freeway Diamond Interchange),
- Freeway tollbooth interchanges (e.g. E-W Freeway Tollbooth Interchange), and
- Divergent diamond interchanges.

Speed

Entered speed values must be between 15 and 65 miles per hour. The speeds to be entered are defined as the cruise speed as vehicles approach the intersection before entering the queue - sometimes referred to as mid-block speed. (Note that the through traffic on the freeway in the diamond interchange does not enter a queue.) If cruise speed is unknown, use the speed limit. Roadway speeds (in miles per hour) are entered for each road.

Approach Traffic Volume

The traffic volume, for each approach, is the peak hour volume on that leg. All data fields must have a value in them; the model will not allow the execution of a modeling run until all fields have been appropriately completed.

Example 1. 4 X 4 Intersection

The 4 X 4 intersection shown in **Figure 10** requires that speeds and approach traffic volumes be entered for all four directions. The order of normal data entry progression using the tab key is indicated numerically in **Figure 10**. The tab key is normally used to facilitate data entry, but data can be entered in any order using the mouse to position the cursor. The model internally calculates right and left turning traffic from the approach traffic volumes entered. The model receptors (at pre-determined worst-case locations) are indicated with blue dots for each of the traffic scenarios.

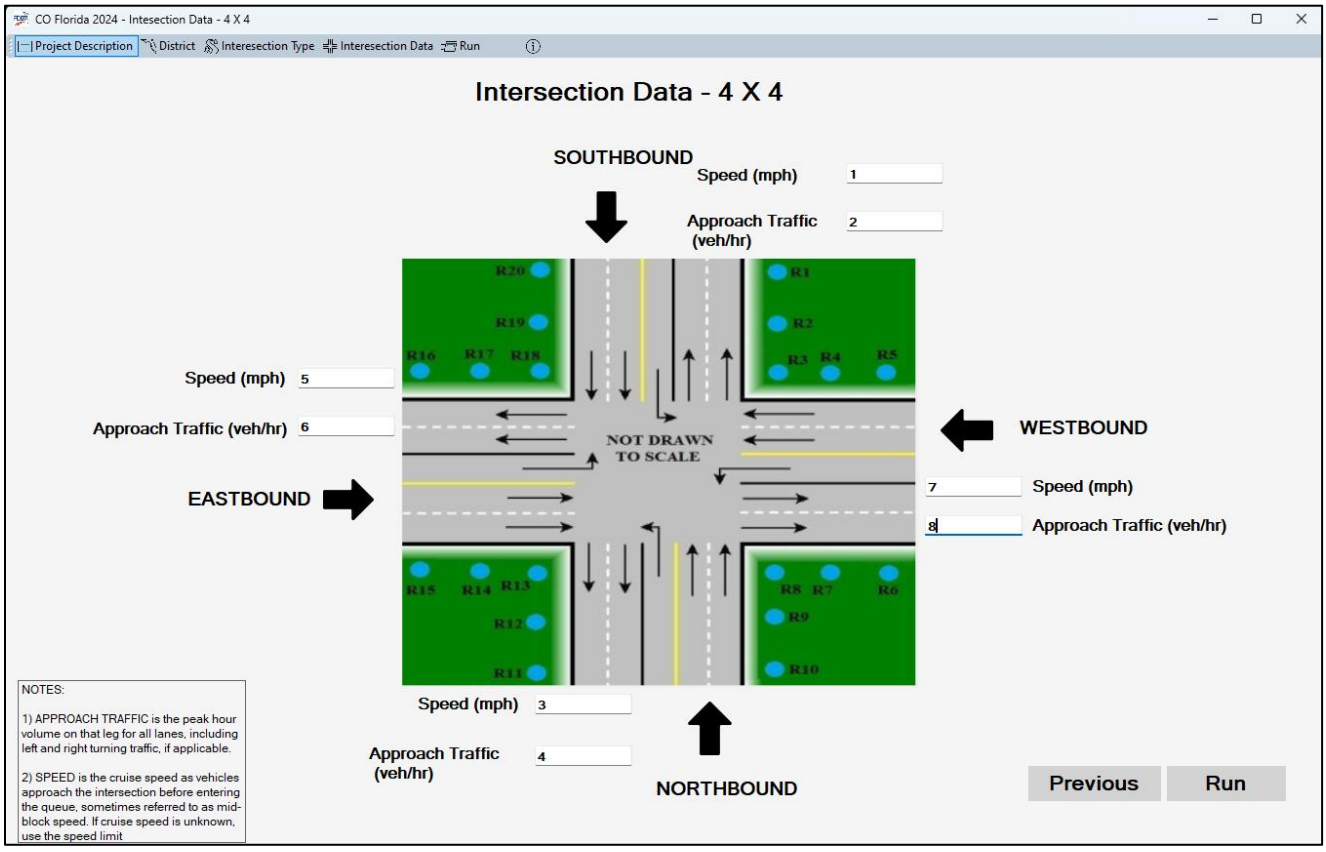

Figure 10 Intersection Data Screen for 4 X 4 Intersections

Example 2. N-S Freeway Diamond Interchange

The N-S freeway diamond interchange shown in **Figure 11** requires that speeds and approach traffic be entered in all four directions, as with the 4 X 4 intersection configuration. The freeway diamond also requires that on- and off-ramp traffic volumes be entered in each direction. Ramp volumes are the total, on or off volumes, regardless of percentages turning right or left. The model automatically apportions the off-ramp traffic to each direction. The tab key may be used to speed up data entry; the order of the tab progression is indicated numerically in **Figure 11**.

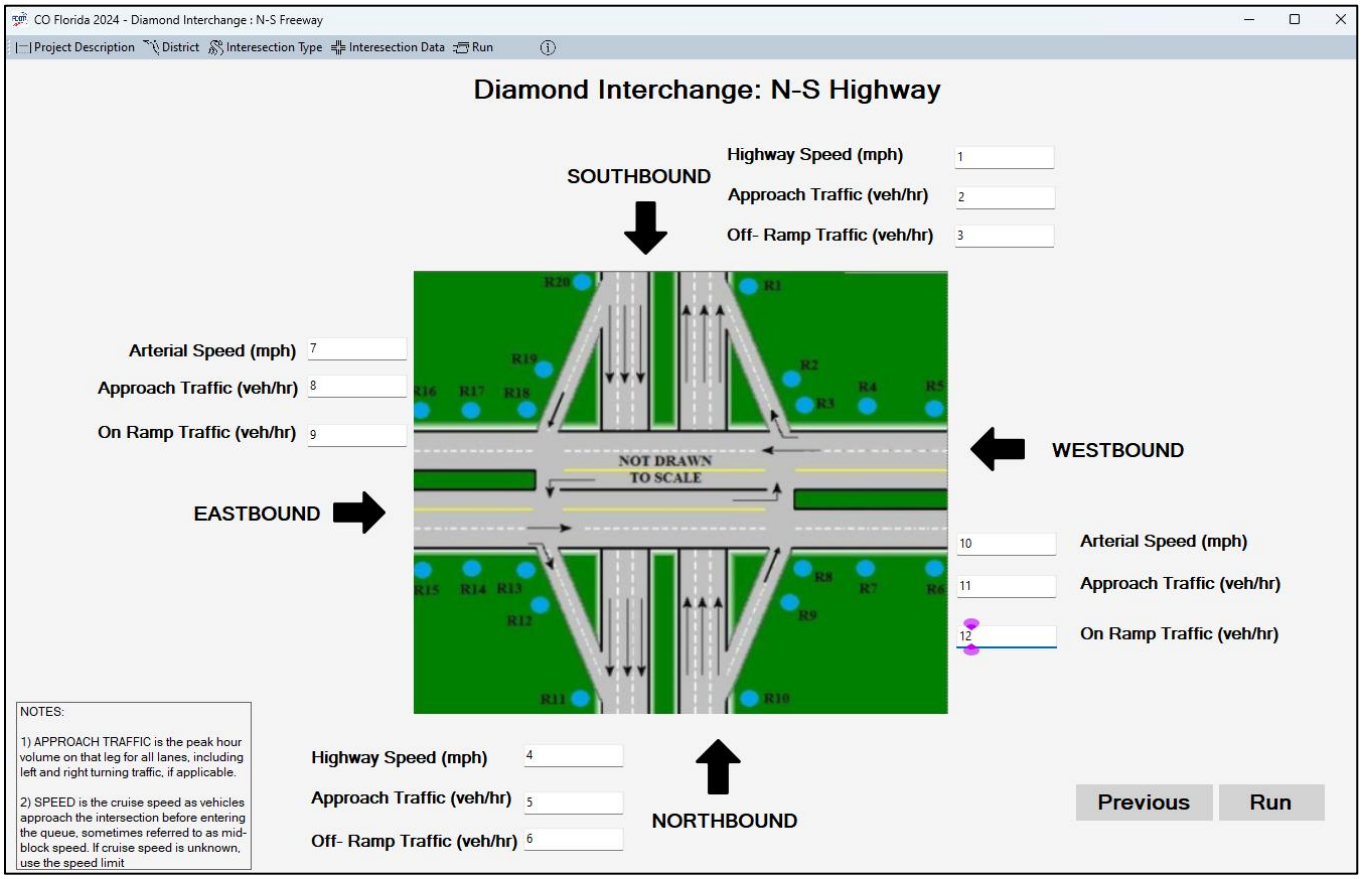

Figure 11 Intersection Data Screen for N-S Freeway Diamond Interchange

Example 3. E-W Freeway Tollbooth Interchange

The E-W freeway tollbooth interchange shown in **Figure 12** requires that speeds and approach traffic be entered in both directions. The tollbooth interchange also requires that the percentage of vehicles utilizing the electronic toll collection-only (ETC-only) lanes be entered in each direction. If there are no ETC-only lanes for the scenario, a zero (0) should be input for this field. Note that the geographic orientation of the freeway tollbooth interchange can be switched, simply by clicking on the center image. The order of the tab progression of data entry is indicated numerically in **Figure 12**.

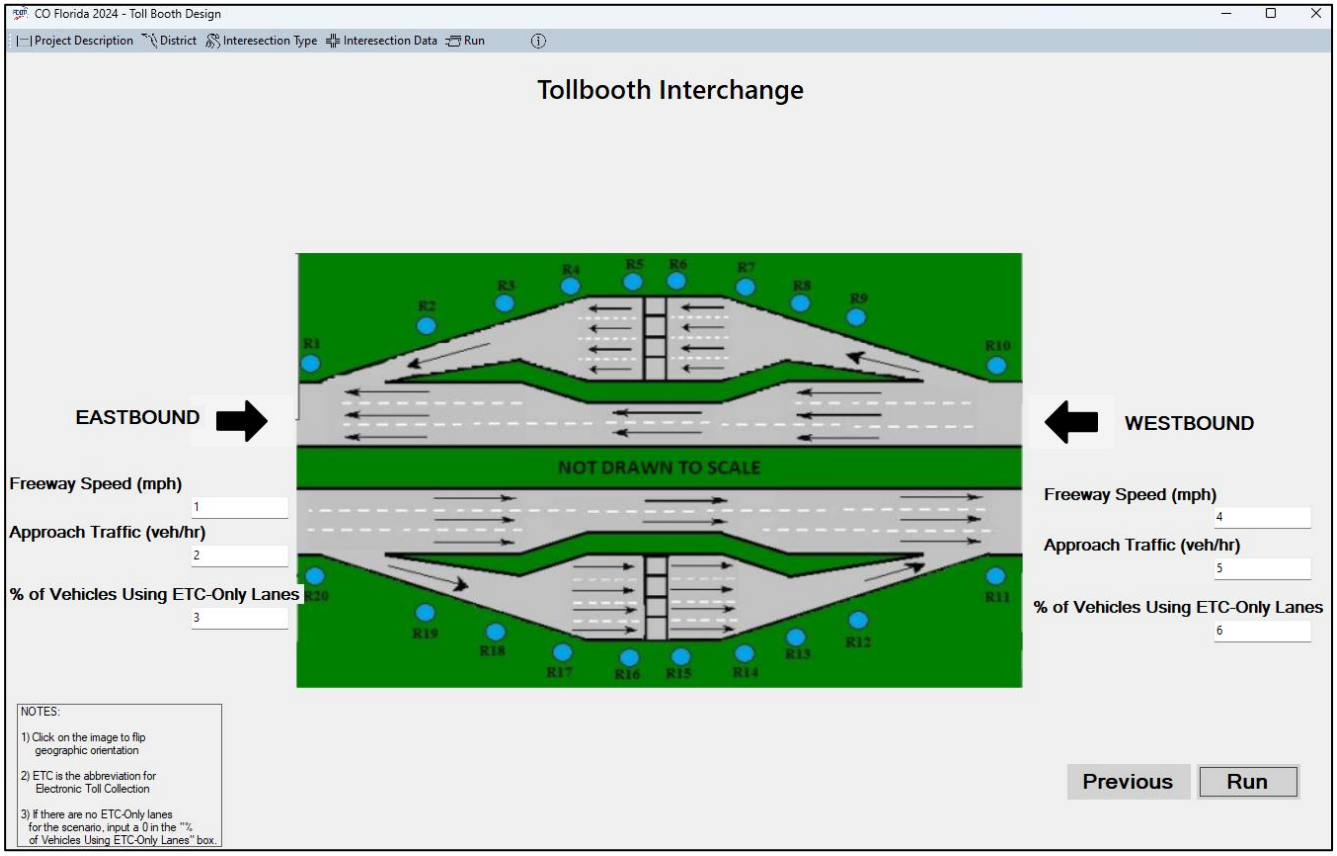

Figure 12 Intersection Data Screen for E-W Freeway Tollbooth Interchange

Example 4. Divergent Diamond Interchange

The Divergent Diamond interchange (DDI) shown in **Figure 13** requires that speeds and approach traffic be entered in both directions. The DDI also requires that on and off-ramp traffic volumes be entered in each direction. Ramp volumes are the total, on- or off-ramp volumes, regardless of percentages turning right or left. The model automatically apportions the off-ramp traffic to each direction. Note that the geographic orientation of the freeway may not be changed. The tab key may be used to speed up data entry; the order of the tab progression is indicated numerically in **Figure 13**.

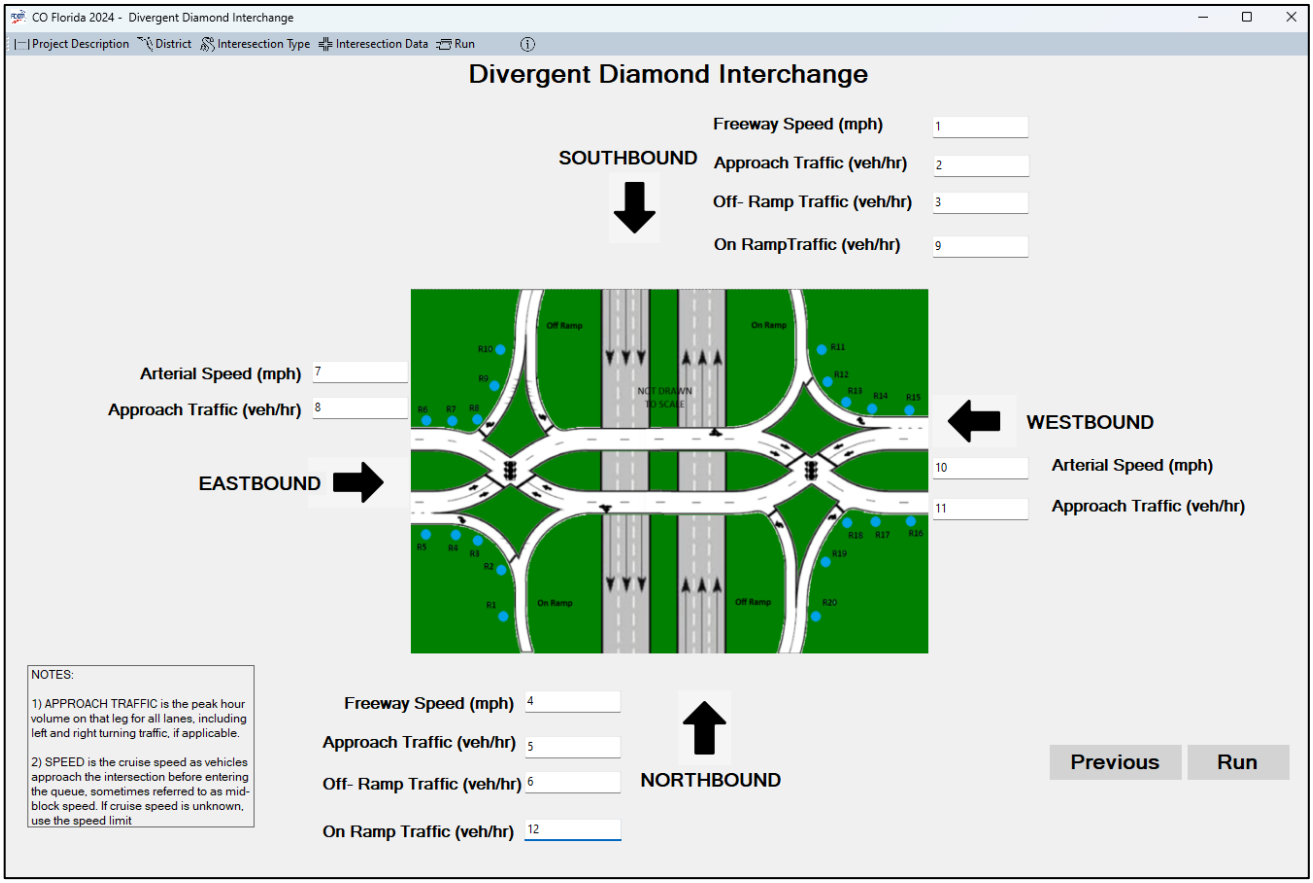

Figure 13 Intersection Data Screen for Divergent Diamond Interchange

Once the **Intersection Data** screen has been completed, a **Run** may be made by either:

- Clicking on the "Run" button on the bottom, right of the screen, or
- Clicking on the "Run" icon, (Run), on upper navigation icon bar.

RECEPTORS

COFL2024 has pre-built all the receptor coordinates for each intersection configuration. Each of the **Intersection Data** screens indicates the approximate receptor locations with blue dots. The exact receptor coordinates for a particular run can be seen by viewing the CAL3QHC2 input file ("*incal3qhc.in*") that has been created by COFL2024. The pre-built receptors used in the model provide a comprehensive 360° representation of potential near-road CO concentrations. **Table 2** provides examples of receptor coordinates that are utilized in creating the CAL3QHC2 input files. These three scenarios correspond to the three intersection configurations which were shown earlier. Note that that the Z-coordinate for all receptors are set to the EPA-recommended height of 6 ft.

Table 2 Receptor Coordinate Examples

Receptor	4 X 4 Intersection		N-S Freeway Diamond Interchange		E-W Freeway Tollbooth Interchange (w/ ETC-only lanes)		Divergent Diamond Interchange	
	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)
1	40	180	46	1036	-2000	68	-100	-1200
2	40	80	116	336	-1250	68	-200	-200
3	40	40	166	46	-500	116	-250	-80
4	80	40	261	46	-150	116	-350	-60
5	180	40	361	46	-50	116	-400	-60
6	180	-40	361	-46	50	116	-400	60
7	80	-40	261	-46	150	116	-350	60
8	40	-40	166	-46	500	116	-250	80
9	40	-80	116	-336	1250	68	-200	200
10	40	-180	46	-1036	2000	68	-100	1200
11	-40	-180	-46	-1036	2000	-68	100	1200
12	-40	-80	-116	-336	1250	-68	200	200
13	-40	-40	-166	-46	500	-116	250	80
14	-80	-40	-261	-46	150	-116	350	60
15	-180	-40	-361	-46	50	-116	400	60
16	-180	40	-361	46	-50	-116	400	-60
17	-80	40	-261	46	-150	-116	350	-60
18	-40	40	-166	46	-500	-116	250	-80
19	-40	80	-116	336	-1250	-68	200	-200
20	-40	180	-46	1036	-2000	-68	100	-1200

EMISSION FACTORS

This latest version of COFL2024 derives its emission factors (EFs) from numerous runs of EPA's motor vehicle emission simulator (MOVES4.0), which have been compiled into text file look-up tables. For years and speeds that fall in between the table values, a double, linear interpolation is employed to produce the desired EF. In 2011, MOVES officially replaced MOBILE6 as the EPA's preferred model for determining the EFs to be used in screening models and other applications.

In addition to the EFs for idle (g/hr) and for various cruise and turning speeds (g/mile), COFL2024 utilizes EF "multipliers" that also have been developed through numerous runs of MOVES. The multipliers provide more realistic and conservative estimates of emissions from accelerating vehicles, by considering the additional load that is placed upon vehicle engines in acceleration mode. The increased emissions from acceleration are particularly evident when vehicles are simultaneously climbing grades and accelerating hard (e.g., while entering a freeway from an on-ramp). **Table 3** provides examples of the effect of grade and acceleration on EF multipliers.

Table 3 Comparison of EF Multipliers

Terminal Speed (mph)	Acceleration Type	% Grade	EF Free Flow (g/mile)	EFAccel (g/mile)	Multiplier
40	Typical	0%	4.41	41.9	9.5
50			4.16	44.2	10.6
60			4.28	46.6	10.9
40	Typical	2%	4.41	44.4	10.1
50			4.16	46.8	11.3
60			4.28	49.4	11.5
40	Aggressive	0%	4.41	62.4	14.2
50			4.16	62.6	15.0
60			4.28	52.3	12.2
40	Aggressive	2%	4.41	66.4	15.1
50			4.16	66.6	16.0
60			4.28	55.6	13.0

RUNNING THE FLORIDA CO SCREENING MODEL

A model run may be made directly from any of the completed **Intersection Data** screens. To make a run from an **Intersection Data** screen, the user may click on the "Run" lower navigation button or on the "Run" icon on the upper navigation icon bar.

With all data entered, COFL2024 extracts the relevant EFs from the table of MOVES EFs for the project FDOT district. The EF extraction occurs instantaneously, and these values are then incorporated into a CAL3QHC input file. Next, the model continues its analysis using CAL3QHC. The black DOS screen will appear for a few seconds while CAL3QHC runs, followed by a brief pause as COFL2024 extracts the results from the CAL3QHC output file ("outcal3qhc.out"). COFL2024 extracts the 1-hour concentrations calculated by CAL3QHC at the various receptors, adds the 1-hr background concentration, and also converts these data to 8- hour concentrations utilizing a total persistence factor (TPF) of 0.6.

The intermediate files are available in the application folder for viewing if desired.
They are as follows:

incal3q.in	the CAL3QHC input file
outcal3q.out	the CAL3QHC output file

The folder, *EFTextFiles* contains lookup tables generated by multiple runs of MOVES that provide the EFs for the years 2010-2050 for each of the 7 FDOT districts. These files should not be modified in any way by the user.

After the model finishes running CAL3QHC, it extracts the outputs and creates a 1- page summary report which is displayed on the **Results** screen. **Figure 14** displays an example **Results** screen for a 4 X 4 Intersection. Note that the user-entered data are summarized on the left side of the **Results** screen along with some of the built-in data used by the model. All concentration results appear on the right-hand side of this screen. The bottom of the screen indicates whether or not the run passed the screening model (did not exceed either the 1-hour (35 ppm) or the 8-hour (9 ppm) CO concentration standards).

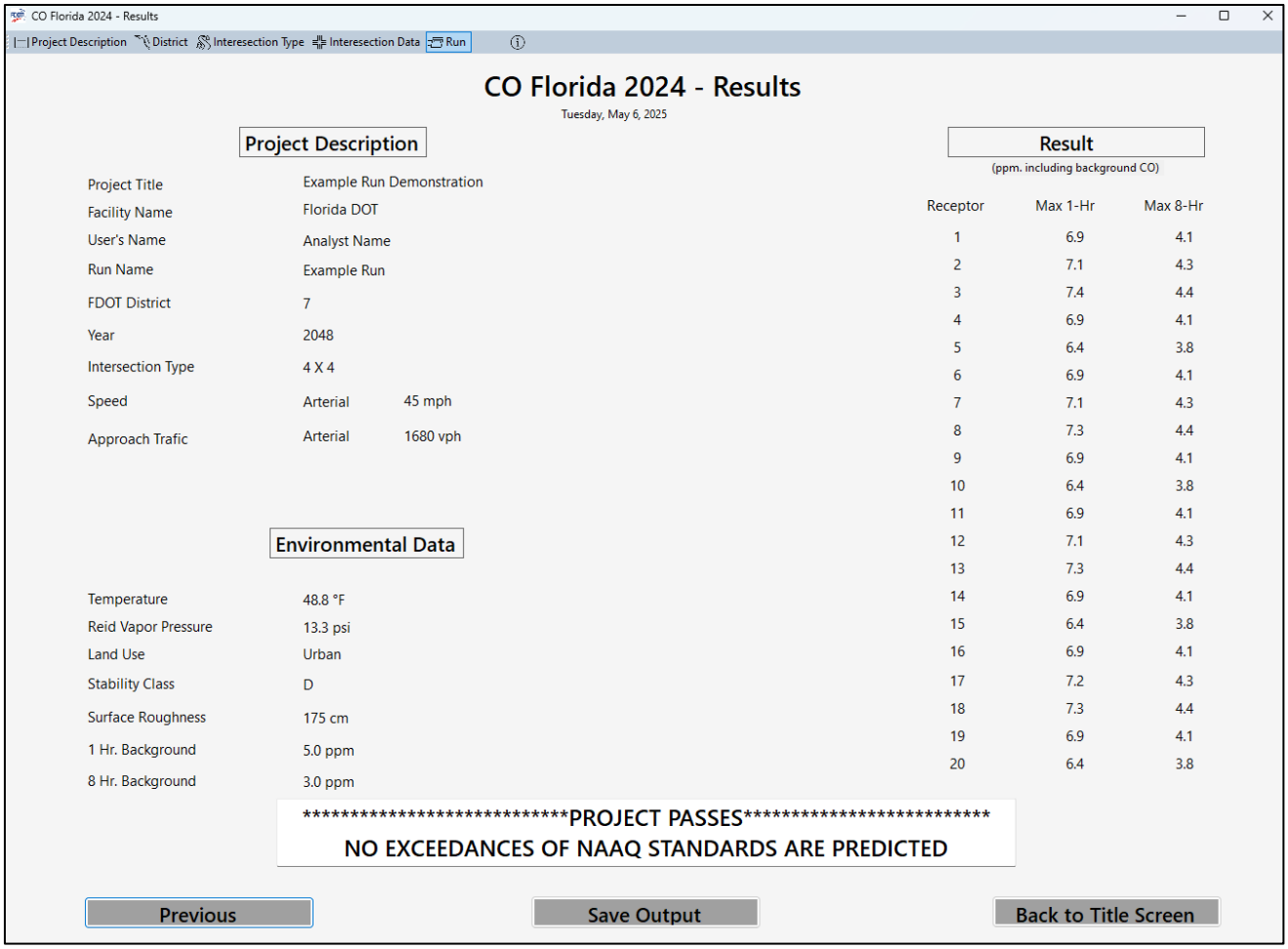

Figure 14 Example Results Screen

Once a run has been made, the user may utilize several different navigation paths:

- Click the "Previous" bottom button to return to the **Intersection Data** screen and modify inputs.
- Click the "Save Output" bottom button to save the results of the run. The default file extension is ".txt", which can be opened with a text view or Microsoft Word. The user may click the down arrow on the "Save as type:" line in the Save As input form to view files with other extensions.
- Click the "Back to Title Screen" bottom button to return to the **Project Description** screen to make modifications to the existing scenario. The program will prompt the user at this point to save all the input from the run that was just made.
- Click the "X" button on the top, right of the screen to exit COFL2024.

EXAMPLE INPUTS AND OUTPUTS

This section includes three examples, as summarized in **Table 4**.

Table 4 Summary of Examples

Example	Intersection Type	Input File	Output File
1	4 X 4	**Figure 16**	**Figure 17**
2	N-S Freeway Diamond Interchange	**Figure 18**	**Figure 19**
3	E-W Freeway Tollbooth Interchange	**Figure 20**	**Figure 21**
4	Divergent Diamond Interchange	**Figure 22**	**Figure 23**

Please note that the input files have been formatted specifically for use by COFL2024 in recalling saved scenarios. If users wish to modify saved scenarios, they should open the saved input files within COFL2024, make the appropriate changes, and then save. Also, if users wish to re-format the saved inputs for use in reports, they should save the modified files to a different folder to prevent COFL2024 from attempting to read an incorrectly formatted input file.

The COFL2024 input files, for examples 1, 2, 3, and 4 are presented in **Figures 15, 17, 19,** and **21**, respectively. They have been modified slightly for purposes of presentation in this User's guide. The information has been placed into four columns and the data type titles have been italicized. Note that some fields remain blank if they don't apply to the example under examination (e.g. the on/off ramp traffic and ETC-only percentage fields are blank for the 4 X 4 intersection example). **Figures 16, 18, 20,** and **22** present the "results" reports for examples 1, 2, 3, and 4 respectively.

Project Title	***Speed South Bound***	***ETC-Only Percentage South Bound***	***Receptor 'X' Coordinates***
Example Run Demonstrations	45		40
			40
	Speed West Bound		40
Facility Name	35	***ETC-Only Percentage West Bound***	80
FDOT			180
	Speed North Bound		180
User's Name	45		80
John Doe		***ETC-Only Percentage North Bound***	40
	Speed East Bound		40
Run Name	35		40
Example One - 4 X 4 Intersection		***ETC-Only Percentage East Bound***	-40
	Approach Traffic South Bound		-40
Project Year	1,450		-40
2025			-80
	Approach Traffic West Bound	***InputsCorrect(1)***	-180
Temperature	1,680	True	-180
48.8			-80
		InputsCorrect(2)	-40
Land Use	***Approach Traffic North Bound***	True	-40
Urban			-40
	1,620	***InputsCorrect(3)***	
Zo		True	***Receptor 'Y' Coordinates***
175	***Approach Traffic East Bound***		
		InputsCorrect(4)	180
Stability Class	1,520	True	80
D			40
	On/Off Ramp Traffic South Bound		40
1-hr CO Background Concentration			40
5.0			-40
			-40
	On/Off Ramp Traffic West Bound		-40
8-hr CO Background Concentration			-80
3.0			-180
			-180
	On/Off Ramp Traffic North Bound		-80
FDOT District Number			-40
7			-40
			-40
	On/Off Ramp Traffic East Bound		40
Intersection Type			40
4 X 4			40
			80
			180

Figure 15 Example 1 (4 X 4 Intersection) Inputs

CO Florida 2024 - Results
Wednesday, May 21, 2025

Project Description

Project Title	Example Run Demonstrations
Facility Name	FDOT
User's Name	John Doe
Run Name	Example One - 4 x 4 Intersection
FDOT District	7
Year	2025
Intersection Type	E-W Freeway 4 X 4
Arterial Speed	35 mph
Max Approach Traffic	1680 vph

Environmental Data

Temperature	48.8 F
Reid Vapor Pressure	13.3 psi
Land Use	Urban
Stability Class	D
Surface Roughness	175 cm
1 Hr. Background Concentration	5.0 ppm
8 Hr. Background Concentration	3.0 ppm

Results
(ppm, including background CO)

Receptor	Max 1-Hr	Max 8-Hr
1	6.5	3.9
2	6.5	3.9
3	6.8	4.1
4	6.5	3.9
5	6.2	3.7
6	6.4	3.8
7	6.5	3.9
8	6.9	4.1
9	6.4	3.8
10	6.1	3.7
11	6.5	3.9
12	6.6	4.0
13	6.8	4.1
14	6.5	3.9
15	6.2	3.7
16	6.4	3.8
17	6.6	4.0
18	6.9	4.1
19	6.5	3.9
20	6.4	3.8

****
**********PROJECT PASSES**********
NO EXCEEDANCES OF NAAQ STANDARDS ARE PREDICTED
****

Figure 16 Example 1 (4 X 4 Intersection) Results

Project Title Example Run Demonstrations	***Speed South Bound*** 45	***ETC-Only Percentage South Bound***	***Receptor 'X' Coordinates*** 46
	Speed West Bound		116
Facility Name FDOT	35	***ETC-Only Percentage West Bound***	166 261
	Speed North Bound		361
User's Name John Doe	45		361 261
	Speed East Bound	***ETC-Only Percentage North Bound***	166
Run Name Example Two - N-S Freeway Diamond	35		116 46
	Approach Traffic South Bound	***ETC-Only Percentage East Bound***	-46
	5,000		-116 -166
Project Year 2025			-261
	Approach Traffic West Bound	***InputsCorrect(1)*** True	-361 -361
Temperature 48.8	3,500		-261
		InputsCorrect(2)	-166
	Approach Traffic North Bound	True	-116
Land Use Urban	6,000	***InputsCorrect(3)*** True	-46 ***Receptor 'Y' Coordinates***
Zo 175	***Approach Traffic East Bound***		1036
	3,800	***InputsCorrect(4)*** True	336 46
Stability Class D			46
	On/Off Ramp Traffic South Bound		46 -46
1-hr CO Background Concentration 5.0	1,000		-46 -46
	On/Off Ramp Traffic West Bound		-336
8-hr CO Background Concentration 3.0	1,500		-1036 -1036 -336
	On/Off Ramp Traffic North Bound		-46
FDOT District Number 7	1,200		-46 -46 46
	On/Off Ramp Traffic East Bound		46
Intersection Type N-S Diamond	1,500		46 336 1036

Figure 17 Example 2 (N-S Freeway Diamond Interchange) Inputs

CO Florida 2024 - Results
Wednesday, May 21, 2025

Project Description

Project Title	Example Run Demonstrations				
Facility Name	FDOT				
User's Name	John Doe				
Run Name	Example Two - N-S Freeway Diamond				
FDOT District	7				
Year	2025				
Intersection Type	E-W Freeway N-S Diamond				
Speed	Arterial	35 mph	Freeway	45 mph	
Approach Traffic	Arterial	3800 vph	Freeway	6000 vph	

Environmental Data

Temperature	48.8 F
Reid Vapor Pressure	13.3 psi
Land Use	Urban
Stability Class	D
Surface Roughness	175 cm
1 Hr. Background Concentration	5.0 ppm
8 Hr. Background Concentration	3.0 ppm

Results
(ppm, including background CO)

Receptor	Max 1-Hr	Max 8-Hr
1	6.5	3.9
2	6.5	3.9
3	6.8	4.1
4	6.5	3.9
5	6.2	3.7
6	6.4	3.8
7	6.5	3.9
8	6.9	4.1
9	6.4	3.8
10	6.1	3.7
11	6.5	3.9
12	6.6	4.0
13	6.8	4.1
14	6.5	3.9
15	6.2	3.7
16	6.4	3.8
17	6.6	4.0
18	6.9	4.1
19	6.5	3.9
20	6.4	3.8

****
**********PROJECT PASSES**********
NO EXCEEDANCES OF NAAQ STANDARDS ARE PREDICTED
****

Figure 18 Example 2 (N-S Freeway Diamond Interchange) Results

Project Title Example Run Demonstrations	***Speed South Bound***	***ETC-Only Percentage South Bound***	***Receptor 'X' Coordinates*** -2000
	Speed West Bound 35	***ETC-Only Percentage West Bound*** 15	-1250 -500 -150
Facility Name FDOT	***Speed North Bound***		-50
User's Name John Doe		***ETC-Only Percentage North Bound***	50 150
	Speed East Bound 35	***ETC-Only Percentage East Bound*** 15	500 1250 2000 2000
Run Name Example Three - E-W Freeway Tollbooth	***Approach Traffic South Bound***		1250
Project Year 2025	***Approach Traffic West Bound*** 7,200	***InputsCorrect(1)*** True	500 150 50
Temperature 48.8	***Approach Traffic North Bound***	***InputsCorrect(2)*** True	-50 -150 -500
Land Use Suburban	***Approach Traffic East Bound*** 8,000	***InputsCorrect(3)*** True	-1250 -2000
Zo 108	***On/Off Ramp Traffic South Bound***	***InputsCorrect(4)*** True	***Receptor 'Y' Coordinates*** 68 68 116
Stability Class D	***On/Off Ramp Traffic West Bound***		116 116 116
1-hr CO Background Concentration 3.3	***On/Off Ramp Traffic North Bound***		116 116
8-hr CO Background Concentration 2.0	***On/Off Ramp Traffic East Bound***		68 68 -68
FDOT District Number 7			-68 -116 -116
Intersection Type Toll Booth			-116 -116 -116
			-116 -68 -68

Figure 19 **Example 3 (E-W Freeway Tollbooth Interchange) Inputs**

CO Florida 2024 - Results
Wednesday, May 21, 2025

Project Description

Project Title	Example Run Demonstrations			
Facility Name	FDOT			
User's Name	John Doe			
Run Name	Example Three - E-W Freeway Tollbooth			
FDOT District	7			
Year	2025			
Intersection Type	E-W Freeway Toll Booth			
Speed	East Bound	35 mph	West Bound	35 mph
Approach Traffic	EB Stopping	6800 vph	WB Stopping	6120 vph
	EB ETC-only	1200 vph	WB ETC-only	1080 vph

Environmental Data

Temperature	48.8 F
Reid Vapor Pressure	13.3 psi
Land Use	Suburban
Stability Class	D
Surface Roughness	108 cm
1 Hr. Background Concentration	3.3 ppm
8 Hr. Background Concentration	2.0 ppm

Results
(ppm, including background CO)

Receptor	Max 1-Hr	Max 8-Hr
1	8.3	5.0
2	6.9	4.1
3	7.3	4.4
4	6.5	3.9
5	5.8	3.5
6	6.2	3.7
7	7.2	4.3
8	6.9	4.1
9	4.8	2.9
10	6.8	4.1
11	8.3	5.0
12	6.9	4.1
13	7.3	4.4
14	6.4	3.8
15	5.8	3.5
16	6.2	3.7
17	7.1	4.3
18	6.9	4.1
19	4.8	2.9
20	6.8	4.1

****
**********PROJECT PASSES**********
NO EXCEEDANCES OF NAAQ STANDARDS ARE PREDICTED
****

Figure 20 Example 3 (E-W Freeway Tollbooth Interchange) Results

Project Title Example Run Demonstrations ***Facility Name*** FDOT ***User's Name*** John Doe *Run Name* **Example** Four - Divergent Diamond ***Project Year*** 2025 ***Temperature*** 48.8 ***Land Use*** Urban ***Zo*** 175 ***Stability Class*** D ***1-hr CO Background Concentration*** 5.0 ***8-hr CO Background Concentration*** 3.0 ***FDOT District Number*** 7 ***Intersection Type*** 4 X 4	***Speed South Bound*** **65** ***Speed West Bound*** 35 ***Speed North Bound*** 65 ***Speed East Bound*** 35 ***Approach Traffic South Bound*** 5,000 ***Approach Traffic West Bound*** 1,500 ***Approach Traffic North Bound*** 6,000 ***Approach Traffic East Bound*** 1,520 ***On/Off Ramp Traffic South Bound*** Off – 1,000 On – 1,500 ***On/Off Ramp Traffic West Bound*** ***On/Off Ramp Traffic North Bound*** Off – 1,200 On – 1,500 ***On/Off Ramp Traffic East Bound***	***ETC-Only Percentage South Bound*** ***ETC-Only Percentage West Bound*** ***ETC-Only Percentage North Bound*** ***ETC-Only Percentage East Bound*** ***InputsCorrect(1)*** True ***InputsCorrect(2)*** True ***InputsCorrect(3)*** True ***InputsCorrect(4)*** True	***Receptor 'X' Coordinates*** -100 -200 -250 -350 -400 -400 -350 -250 -200 -100 100 200 250 350 400 400 350 250 200 100 ***Receptor 'Y' Coordinates*** -1200 -200 -80 -60 -60 60 60 80 200 1200 1200 200 80 60 60 -60 -60 -80 -200 -1200

Figure 21 Example 4 (Divergent Diamond Interchange) Inputs

CO Florida 2024 - Results
Wednesday, May 21, 2025

Project Description

Project Title	Example Run Demonstrations
Facility Name	FDOT
User's Name	John Doe
Run Name	Example Four - Divergent Diamond
FDOT District	7
Year	2025
Intersection Type	E-W Freeway D Diamond
Arterial Speed	35 mph
Max Approach Traffic	1520 vph

Environmental Data

Temperature	48.8 F
Reid Vapor Pressure	13.3 psi
Land Use	Urban
Stability Class	D
Surface Roughness	175 cm
1 Hr. Background Concentration	5.0 ppm
8 Hr. Background Concentration	3.0 ppm

Results
(ppm, including background CO)

Receptor	Max 1-Hr	Max 8-Hr
1	7.6	4.6
2	7.6	4.6
3	6.6	4.0
4	6.4	3.8
5	6.4	3.8
6	6.0	3.6
7	6.2	3.7
8	6.4	3.8
9	6.4	3.8
10	6.4	3.8
11	6.7	4.0
12	8.4	5.0
13	7.0	4.2
14	6.2	3.7
15	6.1	3.7
16	6.4	3.8
17	6.7	4.0
18	6.5	3.9
19	6.3	3.8
20	6.5	3.9

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**********PROJECT PASSES**********
NO EXCEEDANCES OF NAAQ STANDARDS ARE PREDICTED
****

Figure 22 Example 4 (Divergent Diamond Interchange) Results