

APPENDIX 11E – SOFTWARE GUIDANCE

This appendix provides software guidance to illustrate the software-specific data entry procedures to input Oregon specific-default values for freeway and multilane highway analysis using Highway Capacity Manual, 6th Edition analysis procedures.

The following guidance is not intended to be an all-encompassing software tutorial. The guidance assumes the user has a working knowledge of the software and provides a visual reference on how to update the Oregon-specific default values within the existing software tools. The software tools covered in this document include McTrans HCS7, SwashWare HCM-Calc, and FREEVAL.

ODOT Default Values

Many of the Oregon-specific default values such as Peak Hour Factor (PHF) or Truck Percentage are direct inputs in all three software tools. An excerpt of Appendix C listing the Oregon-specific default values are provided in Table 1.

However, ODOT's methodology for default capacity values uses the unit of total passenger cars per hour per lane (pc/hr/ln) while both software tools use a capacity adjustment factor (CAF) and a speed adjustment factor (SAF), which result in the ODOT suggested default bottleneck capacity. As a result, the user will be required to convert the desired bottleneck capacity values, from Table 1 below, into CAF and SAF. An ODOT-specific capacity calculator spreadsheet is provided to assist with this.

A companion Microsoft Excel spreadsheet was developed with this software guidance to aid the user in computing the appropriate CAF and SAF based on free flow speed, weather, and driver population factor. The companion spreadsheet is designed to work with HCS7, HCM-Calc, or FREEVAL – although most computations are automated within FREEVAL already.

Table 1. Oregon Default Values from Appendix C.

Required Data and Units		Source	Suggested Default Value		
A	Peak Hour Factor (PHF)	HCM 6 th Edition	Rural:	0.94	
			Urban:	0.88	
B	Truck Percentage (%)	HCM 6 th Edition	Rural:	26%	
			Small Urban:	19%	
			Medium Urban:	10%	
			Large Urban:	7%	
C	Terrain Type	HPMS and ODOT Vertical Grade Information	Generally level with few exceptions in the Cascade Range and Blue Mountains (see Exhibit 11-28)		
D	Area Type	GIS Database	No default, use urban or rural based on GIS		
E	Weave Volumes	Traffic Counts	(Ramp to ramp flow) = (on-ramp flow)/(mainline flow) * (off-ramp flow)		
F	Driver Population Factor	Exhibit 11-15	Rural:	0.939	
			Urban:	0.968	
G	Acceleration Lanes (ft)	ODOT 2012 HDM	750 ft		
H	Deceleration Lanes (ft)	ODOT 2012 HDM	500 ft		
I	Free Flow Speed (mph)	ODOT TransGIS	Speed Limit + 5 mph		
J	Ramp Free Flow Speed (mph)	HCM 6 th Edition, and ODOT 2012 HDM	35 mi/h for loops ramps, 45 mi/h for diamond ramps		
K	Jam Density (pc/mi/ln)	HCM 6 th Edition	190 pc/mi/ln		
L	Queue Discharge Capacity Drop (%)	HCM 6 th Edition	7%		
M	Default Bottleneck Capacities (pc/hr/ln)	Florida DOT Defaults for Freeway Segments	Urban merge and diverge freeway segments	3 lanes	2,100
				2: 3> lanes	2,000
			Urban weaving freeway segments	3 lanes	2,200
				2: 3> lanes	2,100
			Rural merge and diverge segments	3 lanes	1,900
				2: 3> lanes	1,800

HCS7 Software Guidance

The guidance below highlights the location of HCS7 (HCS Freeways Version 7.3) input fields and notes the corresponding Oregon-specific default values in Table 1. This section is organized based on the freeway analysis options available in HCS7: Basic, Merge, Diverge, Weaving, and Facility analysis. Oregon default values are noted using letters **(A)** through **(M)** in the screen captures and correspond to the first column of Table 1. Inputs noted with a yellow circle **(M)** will require conversion to an adjustment factor, which can be performed using the adjustment factors spreadsheet provided. The user should refer to the Highway Capacity Manual 6th Edition for inputs not noted in Figures 1 – 4.

Basic Segment Analysis

Figure 1. Basic Segment Analysis Window in HCS7

The screenshot displays the 'Basic Segment Analysis Window' in HCS7, organized into three main sections: Geometric Data, Demand Data, and Adjustment Factors. Each section contains various input fields, some of which are highlighted with callouts (I, B, F, C, A, M) and dashed boxes.

Section	Field Name	Value / Option	Callout
Geometric Data	Number of Lanes	3	
	Measured FFS	<input type="checkbox"/>	
	Base Free Flow Speed, mi/h	75.4	I
	Length, ft	-	
	Lane Width, ft	12	
	Managed Lane	<input type="checkbox"/>	
	Terrain Type	Level	C
Demand Data	Demand, veh/h	0	
	Total Trucks, %	0.00	B
	Tractor-Trailers (TT), %	-	
	Peak Hour Factor	0.94	A
	Single-Unit Trucks (SUT), %	-	
Adjustment Factors	Driver Population	All Familiar	
	Weather Type	Non-Severe Weather	
	Incident Type	No Incident	
	Work Zone	<input type="checkbox"/>	
	Speed Adjustment Factor	1.000	M

Merge Segment Analysis

Figure 2. Merge Segment Analysis Window in HCS7

Geometric Data			
Number of Lanes	3	Ramp Lanes	1
Freeway FFS, mi/h	75.4	Ramp FFS, mi/h	35.0
Freeway Length, ft	1500	Ramp Side	Right
Freeway Terrain Type	Level	Ramp Terrain Type	Level
Freeway Grade, %	-	Ramp Grade, %	-
Freeway Grade Length, mi	-	Ramp Grade Length, mi	-
Highway or C-D Roadway	<input type="checkbox"/>	Length of First Accel. Lane (LA), ft	800
Managed Lane	<input type="checkbox"/>	Length of Second Accel. Lane (LA2), ft	-
Cross Weaving Effect	<input type="checkbox"/>		
Demand Data			
Freeway Demand, veh/h	0	Merge Demand, veh/h	0
Freeway Peak Hour Factor	0.94	Ramp Peak Hour Factor	0.94
Freeway Total Trucks, %	0.00	Ramp Total Trucks, %	0.00
Freeway Single-Unit Trucks (SUT), %	-	Ramp Single-Unit Trucks (SUT), %	-
Freeway Tractor-Trailers (TT), %	-	Ramp Tractor-Trailers (TT), %	-
Proportion of Flow Outside 4th Lane	-		
Adjustment Factors			
Freeway Driver Population	All Familiar	Ramp Driver Population	All Familiar
Freeway Weather Type	Non-Severe Weather	Ramp Weather Type	Non-Severe Weather
Freeway Speed Adjustment Factor	1.000	Ramp Speed Adjustment Factor	1.000
Freeway Capacity Adjustment Factor	1.000	Ramp Capacity Adjustment Factor	1.000
Freeway Demand Adjustment Factor	1.000	Ramp Demand Adjustment Factor	1.000
Incident Type	No Incident		
Adjacent Ramps			
Upstream Ramp	No Ramp	Downstream Ramp	No Ramp
Distance to Upstream Ramp, ft	-	Distance to Downstream Ramp, ft	-
Upstream Ramp Terrain	Level	Downstream Ramp Terrain	Level
Upstream Ramp Demand, veh/h	0	Downstream Ramp Demand, veh/h	0
Upstream Ramp PHF	0.94	Downstream Ramp PHF	0.94
Upstream Ramp Trucks, %	0.00	Downstream Ramp Trucks, %	0.00

Diverge Segment Analysis

Figure 3. Diverge Segment Analysis Window in HCS7

Geometric Data					
(I)	Number of Lanes	3	Ramp Lanes	1	(J)
	Freeway FFS, mi/h	75.4	Ramp FFS, mi/h	35.0	
	Freeway Length, ft	1500	Ramp Side	Right	
(C)	Freeway Terrain Type	Level	Ramp Terrain Type	Level	
	Freeway Grade, %	-	Ramp Grade, %	-	
	Freeway Grade Length, mi	-	Ramp Grade Length, mi	-	
	Highway or C-D Roadway	<input type="checkbox"/>	(H)	Length of First Decel. Lane (LD), ft	400
	Managed Lane	<input type="checkbox"/>		Length of Second Decel. Lane (LD2), ft	-
	Cross Weaving Effect	<input type="checkbox"/>			
Demand Data					
(A)	Freeway Demand, veh/h	0	Diverge Demand, veh/h	0	
(B)	Freeway Peak Hour Factor	0.94	Ramp Peak Hour Factor	0.94	
	Freeway Total Trucks, %	0.00	Ramp Total Trucks, %	0.00	
	Freeway Single-Unit Trucks (SUT), %	-	Ramp Single-Unit Trucks (SUT), %	-	
	Freeway Tractor-Trailers (TT), %	-	Ramp Tractor-Trailers (TT), %	-	
	Proportion of Flow Outside 4th Lane	-			
Adjustment Factors					
(F)	Freeway Driver Population	All Familiar	Ramp Driver Population	All Familiar	
	Freeway Weather Type	Non-Severe Weather	Ramp Weather Type	Non-Severe Weather	
(M)	Freeway Speed Adjustment Factor	1.000	Ramp Speed Adjustment Factor	1.000	
	Freeway Capacity Adjustment Factor	1.000	Ramp Capacity Adjustment Factor	1.000	
	Freeway Demand Adjustment Factor	1.000	Ramp Demand Adjustment Factor	1.000	
	Incident Type	No Incident			
Adjacent Ramps					
	Upstream Ramp	No Ramp	Downstream Ramp	No Ramp	
	Distance to Upstream Ramp, ft	-	Distance to Downstream Ramp, ft	-	
	Upstream Ramp Terrain	Level	Downstream Ramp Terrain	Level	
	Upstream Ramp Demand, veh/h	0	Downstream Ramp Demand, veh/h	0	
	Upstream Ramp PHF	0.94	Downstream Ramp PHF	0.94	
	Upstream Ramp Trucks, %	0.00	Downstream Ramp Trucks, %	0.00	

Weaving Segment Analysis

Figure 4. Weaving Segment Analysis Window in HCS7

Freeway Geometric Data

Number of Lanes	3	Terrain Type	Level
Free-Flow Speed, mi/h	75.4	Percent Grade, %	-
Weaving Configuration	One-Sided	Grade Length, mi	-
Number of Maneuver Lanes	2	Minimum FR Lane Changes	1
Short Length, ft	500	Minimum RF Lane Changes	1
Interchange Density, int/mi	0.80	Minimum RR Lane Changes	0
Managed Lane	<input type="checkbox"/>	Highway or C-D Roadway	<input type="checkbox"/>
Cross Weaving Managed Lane	<input type="checkbox"/>		

Ramp Geometric Data

On-Ramp		Off-Ramp	
Number of Lanes	1	Number of Lanes	1
Free-Flow Speed, mi/h	35.0	Free-Flow Speed, mi/h	35.0
Terrain Type	Level	Terrain Type	Level
Grade, %	-	Grade, %	-
Grade Length, ft	-	Grade Length, ft	-

Demand Data

Freeway-to-Freeway		Ramp-to-Freeway		Ramp-to-Ramp		Freeway-to-Ramp	
Demand, veh/h	0	Demand, veh/h	0	Demand, veh/h	0	Demand, veh/h	0
Demand Adjustment Factor	1.000	Demand Adjustment Factor	1.000	Demand Adjustment Factor	1.000	Demand Adjustment Factor	1.000
Peak Hour Factor	0.94	Peak Hour Factor	0.94	Peak Hour Factor	0.94	Peak Hour Factor	0.94
Total Trucks, %	0.00	Total Trucks, %	0.00	Total Trucks, %	0.00	Total Trucks, %	0.00
Single-Unit Trucks (SUT), %	-	Single-Unit Trucks (SUT), %	-	Single-Unit Trucks (SUT), %	-	Single-Unit Trucks (SUT), %	-
Tractor-Trailers (TT), %	-	Tractor-Trailers (TT), %	-	Tractor-Trailers (TT), %	-	Tractor-Trailers (TT), %	-

Freeway Adjustment Factors

Driver Population	All Familiar	Speed Adjustment Factor	1.000
Weather Type	Non-Severe Weather	Capacity Adjustment Factor	1.000
Incident Type	No Incident		

Facility Analysis

Figure 5. Facility Analysis Window in HCS7

The screenshot displays the Facility Analysis Window in HCS7, organized into three main sections:

- Project Properties:** Includes fields for Analyst, Agency, Analysis Year (2018), Project Description, Jurisdiction, Time Period Analyzed, and Date (6/4/2018).
- Facility Global Inputs:** This section is highlighted with a dashed box and includes:
 - Jam Density, pc/mi/ln: 190.0
 - Queue Discharge Capacity Drop, %: 7
 - Managed Lane:
 - Mixed Flow Model:
 - Density at Capacity, pc/mi/ln: 45.0
 - Area Type: Urban
 - Demand Factor: 1.000
- Segments Global Inputs:** This section includes:
 - Freeway Lanes: 3
 - Freeway FFS, mi/h: 75.4
 - Freeway Terrain Type: Level
 - Freeway Peak Hour Factor: 0.94
 - Freeway Total Trucks, %: 0.00
 - Driver Population: All Familiar
 - Ramp Lanes: 1
 - Ramp FFS, mi/h: 35.0
 - Ramp Terrain Type: Level
 - Ramp Peak Hour Factor: 0.94
 - Ramp Total Trucks, %: 0.00
 - Weather Type: Non-Severe Weather

At the bottom, there is a "Select All" checkbox (checked) and an "Apply Global Inputs" button.

HCM-Calc software guidance

The guidance below highlights the location of HCM-Calc input fields and notes the corresponding Oregon-specific default values. This section is organized based on the analysis options available in HCM-Calc: Basic, Merge, Diverge, Weaving, Facility, and Multilane Highway analysis. Oregon default values are noted using letters **A** through **M** in the screen captures and correspond to the first column of Table 1. Inputs noted with a yellow circle (e.g. **M**) will require conversion to an adjustment factor, which can be performed using the adjustment factors spreadsheet provided. The user should refer to the Highway Capacity Manual 6th Edition for inputs not noted in Figures 6 - 16.

Basic Segment Analysis

Figure 6. Basic Segment Analysis Window in HCM-Calc

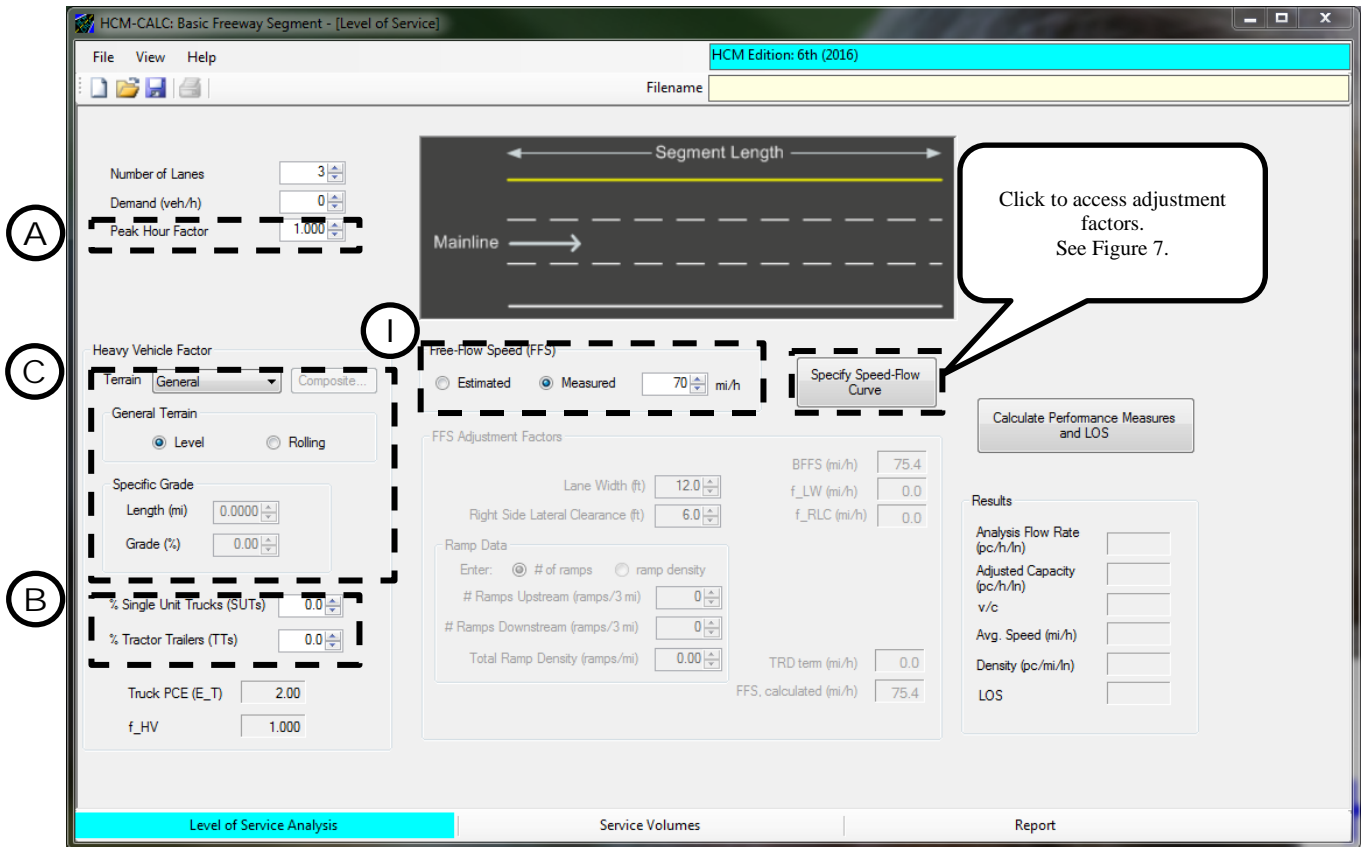
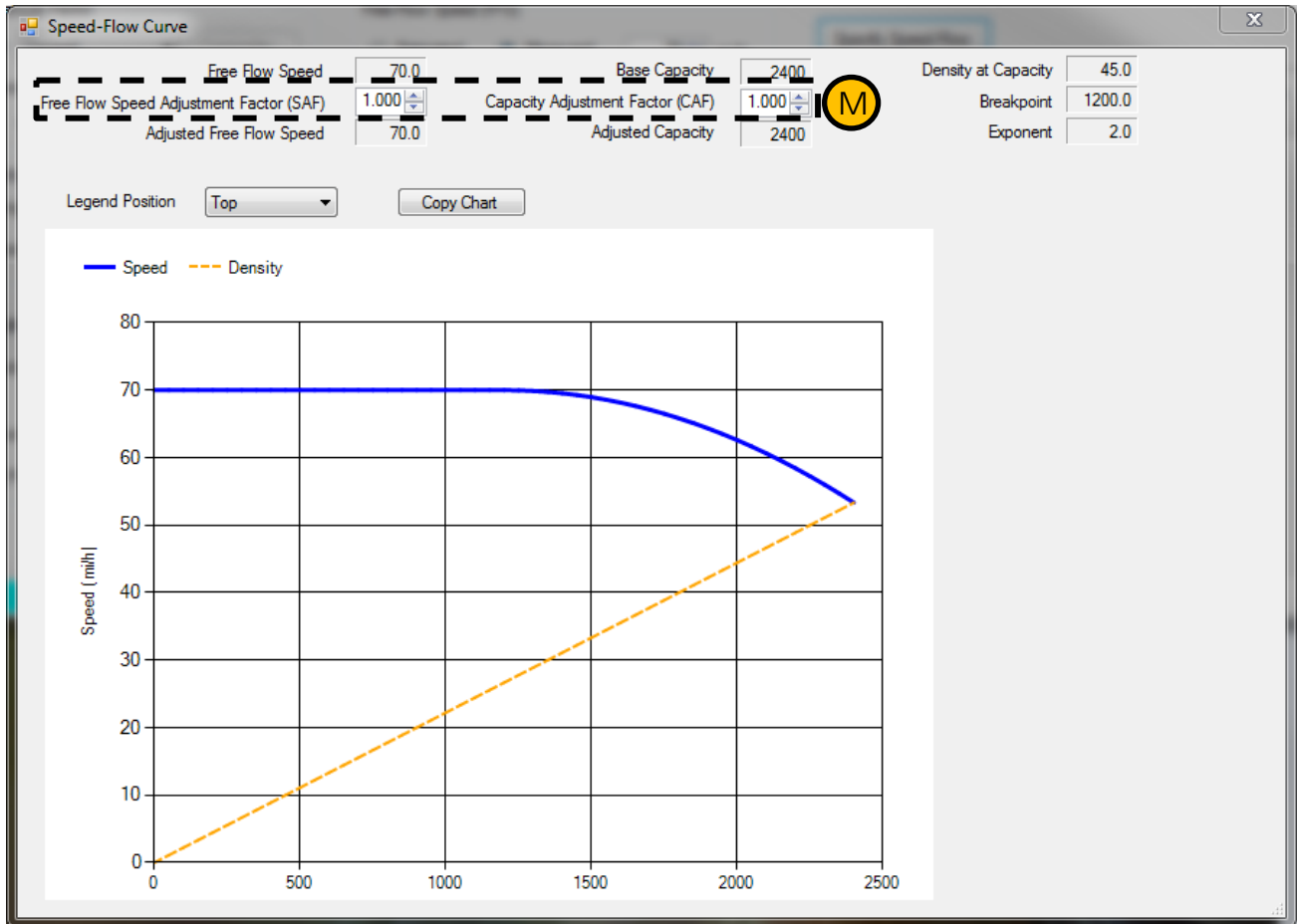


Figure 7. Speed-Flow Curve Accessible Through the Basic Segment and Multilane Highway Window in HCM-Calc



Merge Segment Analysis

Figure 8. Merge Segment Analysis Window in HCM-Calc

The screenshot displays the HCM-CALC software interface for On-Ramp Segment Analysis. The window title is "HCM-CALC: On-Ramp Segment - [Level of Service]" and it is running the "HCM Edition: 6th (2016)". The interface is organized into several functional areas:

- Mainline Section:** Contains input fields for "Number of Lanes" (3), "Demand (veh/h)" (0), "Peak Hour Factor" (1.000), "FFS Adjustment Fact." (1.000), "Free-Flow Speed (mi/h)" (70.0), "Capacity Adjustment Fact." (1.000), and "Heavy Vehicle Factor".
- On-Ramp Section:** Includes "Demand (veh/h)" (0), "% SUTs" (0.0), "% TTs" (0.0), "f_HV" (1.000), "Number of Lanes" (1), "Free-Flow Speed (mi/h)" (40), and "Acceleration Lane Length (ft)" (1000).
- Adjacent Ramp Data:** Features checkboxes for "Upstream Off-Ramp?" and "Downstream Off-Ramp?", along with fields for "Distance (ft)", "Demand (veh/h)", "% SUTs", "% TTs", and "f_HV".
- Diagram:** A central schematic shows a "Mainline" merging with an "On Ramp". It labels the "Segment Length" and "Acceleration Length".
- Results Panel:** A list of performance measures and Level of Service (LOS) metrics, including "Analysis Flow Rate, Mainline (pc/h)", "v_up (pc/h)", "L_EQup (ft)", "P_FMup", "v_down (pc/h)", "L_EQdown (ft)", "P_FMdown", "P_FM", "v_12 (pc/h)", "v_R12 (pc/h)", "S_R (mi/h)", "D_R (pc/mi/h)", "LOS", "Avg. Speed, All Lanes (mi/h)", and "Density, All Lanes (pc/mi/h)".
- Navigation and Settings:** The bottom of the window has tabs for "Level of Service Analysis", "Service Volumes", and "Report". A "Calculate Performance Measures and LOS" button is located in the top right.

Circled letters A through J are overlaid on the interface to highlight specific input fields and sections.

Diverge Segment Analysis

Figure 9. Diverge Segment Analysis Window in HCM-Calc

The screenshot displays the HCM-CALC software interface for a Diverge Segment Analysis. The window title is "HCM-CALC: Off-Ramp Segment - [Level of Service]" and it is running the "HCM Edition: 6th (2016)".

Mainline Section:

- Number of Lanes: 3
- Demand (veh/h): 0
- Peak Hour Factor: 1.000
- FFS Adjustment Fact.: 1.000
- Free-Flow Speed (mi/h): Measured, 70.0
- Capacity Adjustment Fact.: 1.000
- Heavy Vehicle Factor: Terrain: General, Level
- Specific Grade: Length (mi): 0.0000, Grade (%): 0.00
- % Single Unit Trucks (SUTs): 0.0
- % Tractor Trailers (TTs): 0.0
- Truck PCE (E_T): 2.00
- f_{HV}: 1.000

Off-Ramp Section:

- Demand (veh/h): 0
- % SUTs: 0.0
- % TTs: 0.0
- f_{HV}: 1.000
- Number of Lanes: 1
- Free-Flow Speed (mi/h): 40
- Deceleration Lane Length (ft): 450

Adjacent Ramp Data:

- Upstream On-Ramp? Distance (ft): 0, Demand (veh/h): 0, % SUTs: 0.0, % TTs: 0.0, f_{HV}: 1.000
- Downstream Off-Ramp? Distance (ft): 0, Demand (veh/h): 0, % SUTs: 0.0, % TTs: 0.0, f_{HV}: 1.000

Results Panel:

- Analysis Flow Rate, Mainline (pc/h)
- Analysis Flow Rate, Ramp (pc/h)
- v_{FO} (pc/h)
- Mainline Capacity (pc/h)
- Off-Ramp Capacity (pc/h)
- Mainline v/c
- Off-Ramp v/c
- v_{up} (pc/h)
- L_{EQup} (ft)
- P_{FDup}
- v_{down} (pc/h)
- L_{EQdown} (ft)
- P_{FDdown}
- P_{FD}
- v₁₂ (pc/h)
- S_R (mi/h)
- D_R (pc/mi/h)
- LOS
- Avg. Speed, All Lanes (mi/h)
- Density, All Lanes (pc/mi/h)

Diagram: A schematic diagram of a diverge segment showing a Mainline lane splitting into an Off-Ramp lane. Labels include "Segment Length" and "Deceleration Length".

Annotations: Circled letters A, B, C, J, M, and H are placed on the left side of the window to highlight specific input fields and sections.

Weaving Segment Analysis

Figure 10. Weaving Segment Analysis Window in HCM-Calc

Mainline

Segment Type: Freeway

Number of Lanes: 3

Demand (veh/h): 0

Peak Hour Factor: 1.000

FFS Adjustment Fact.: 1.000

Free-Flow Speed (mi/h): 70.0

Measured Estimated (Inputs...: N/A)

Interchange Density (int/mi): 0.00

Heavy Vehicle Factor

Terrain: General

General Terrain: Level Rolling

Specific Grade: Length (mi): 0.0000, Grade (%): 0.00

% Single Unit Trucks (SUTs): 0.0

% Tractor Trailers (TTs): 0.0

Truck PCE (E_T): 2.00

f_HV: 1.000

Weave Configuration

One-Sided Two-Sided

Short Length (L_S) (ft): 0

of Weaving Lanes (N_WL): 2

Min. Lane Changes Freeway-Ramp (LC_FR): 1

Min. Lane Changes Ramp-Freeway (LC_RF): 1

Min. Lane Changes Ramp-Ramp (LC_RR): 0

Diagram: A schematic of a weaving segment showing a mainline with an auxiliary lane. An on-ramp enters from the left and an off-ramp exits to the right. The segment length and short length are indicated. A blue note below the diagram reads: "The on-ramp and off-ramp demand volumes should not include the ramp-to-ramp volume."

Results

Calculate Performance Measures and LOS

v_FF (pc/h)

v_FR (pc/h)

v_RF (pc/h)

v_RR (pc/h)

Volume Ratio

Maximum Length (ft)

C_IWL (pc/h/ln)

C_IW (pc/h)

C_W (veh/h)

v/c

LC_min (c/h)

LC_W (c/h)

I_NW

LC_NW (c/h)

LC_All (c/h)

Weaving Intensity

Non-Weaving Speed (mi/h)

Weaving Speed (mi/h)

Avg. Speed (mi/h)

Density (pc/mi/ln)

LOS

Level of Service Analysis | Service Volumes | Report

Facility Analysis

Input parameters for the facility analysis are included in the facility analysis main window, and within the nested windows for each freeway segment defined in the facility. This guidance illustrates the location of the HCM-Calc input fields in the main window (Figure 11) and for the individual segment types (Figures 12 through 15).

Figure 11. Facility Analysis Main Window in HCM-Calc

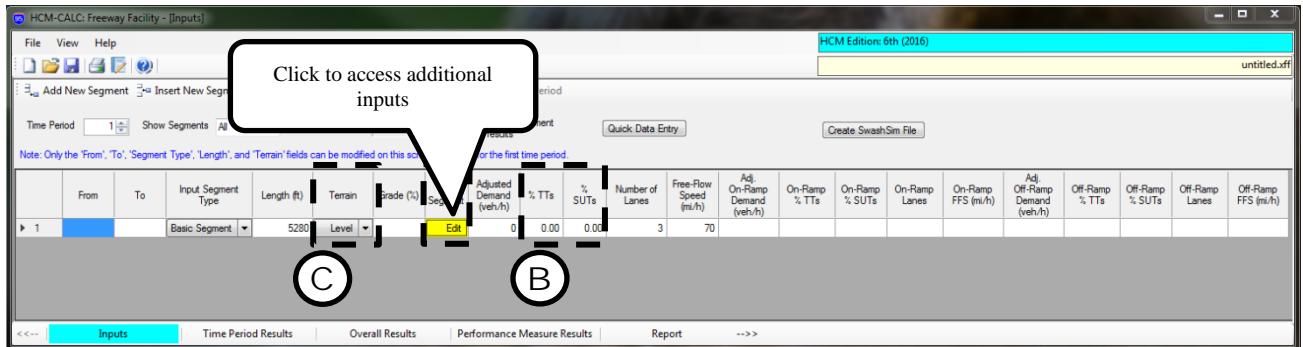


Figure 12. Basic Segment Window within the Facility Analysis in HCM-Calc

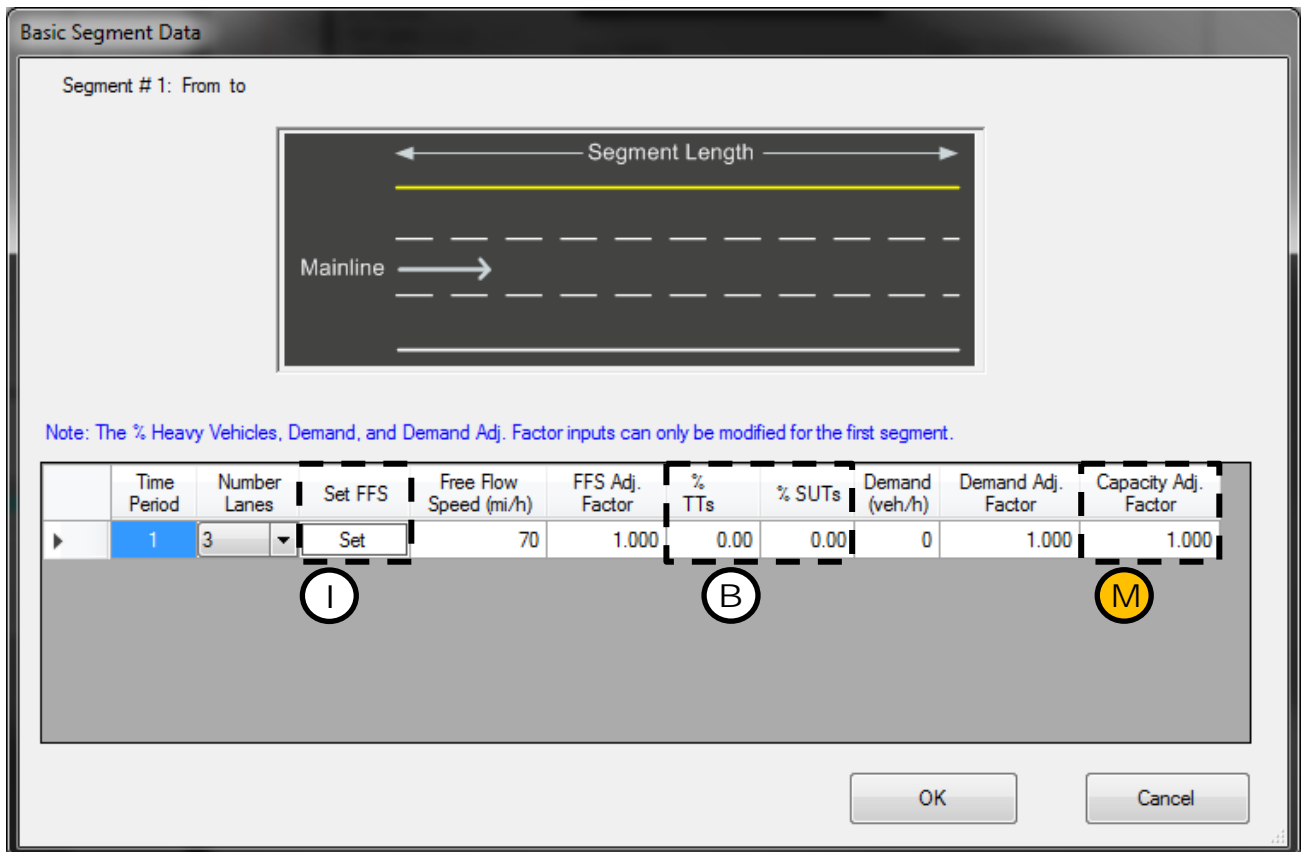


Figure 13. Merging Segment Window within the Facility Analysis in HCM-Calc

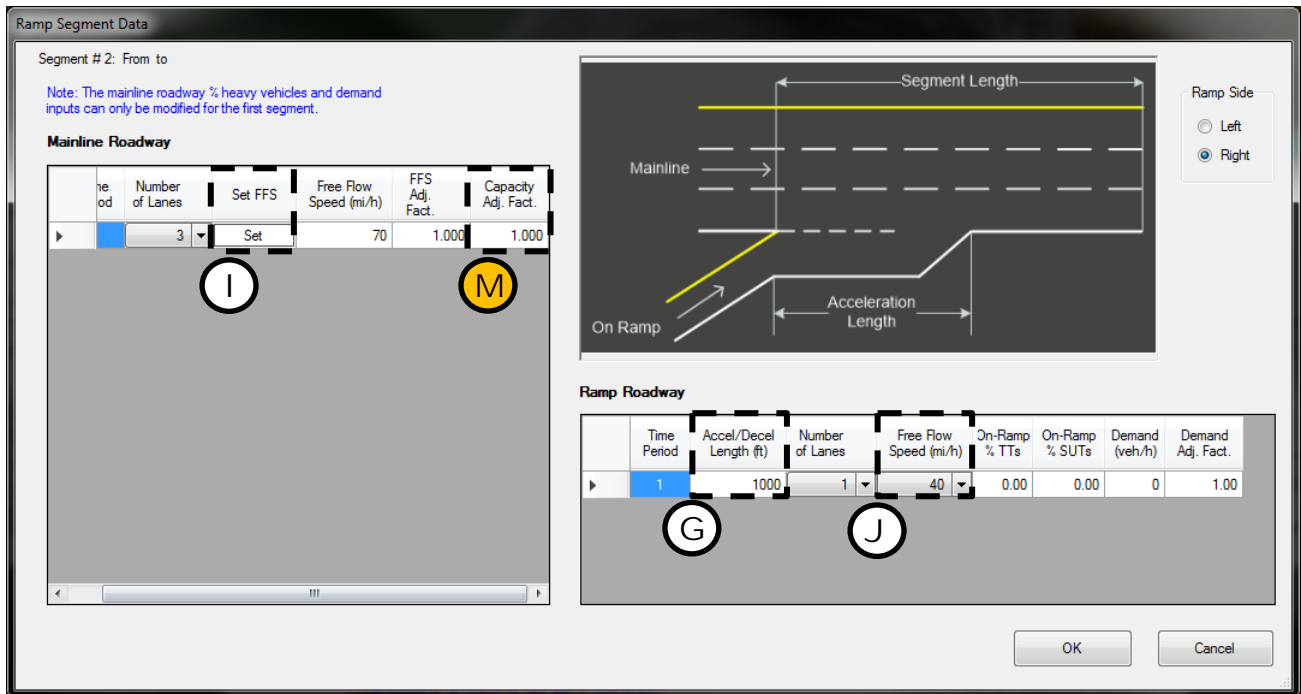


Figure 14. Diverging Segment Window within the Facility Analysis in HCM-Calc

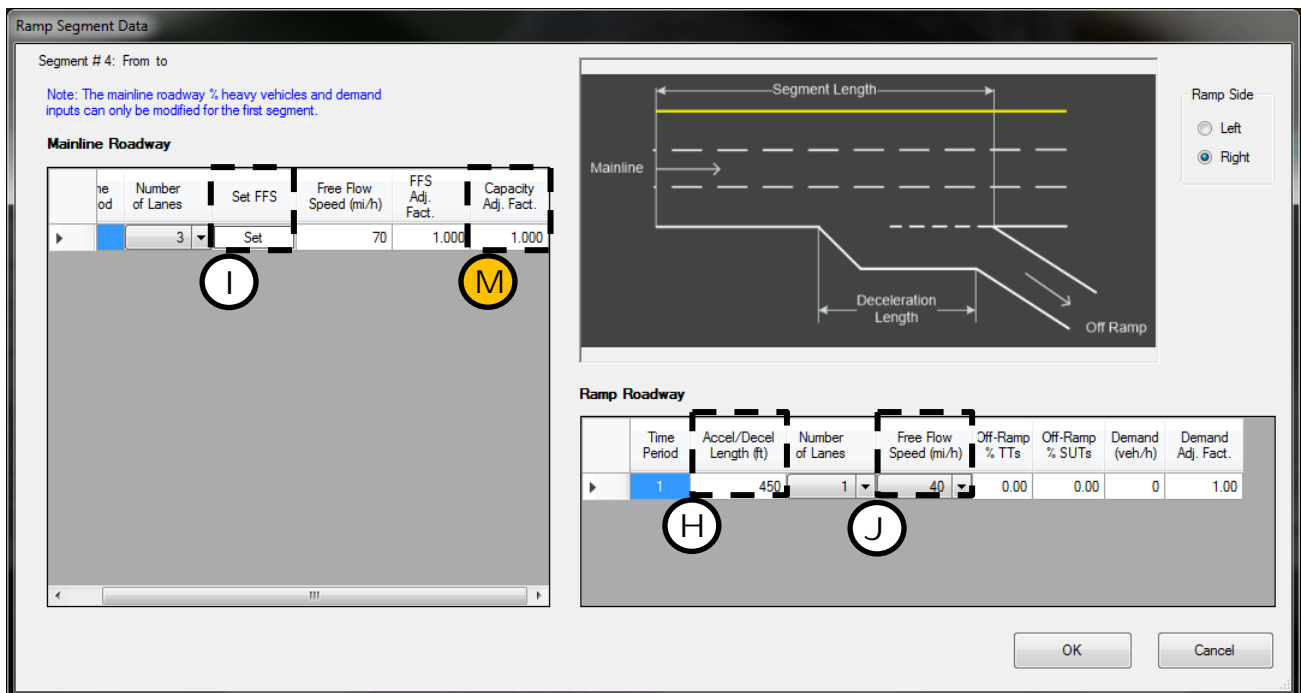
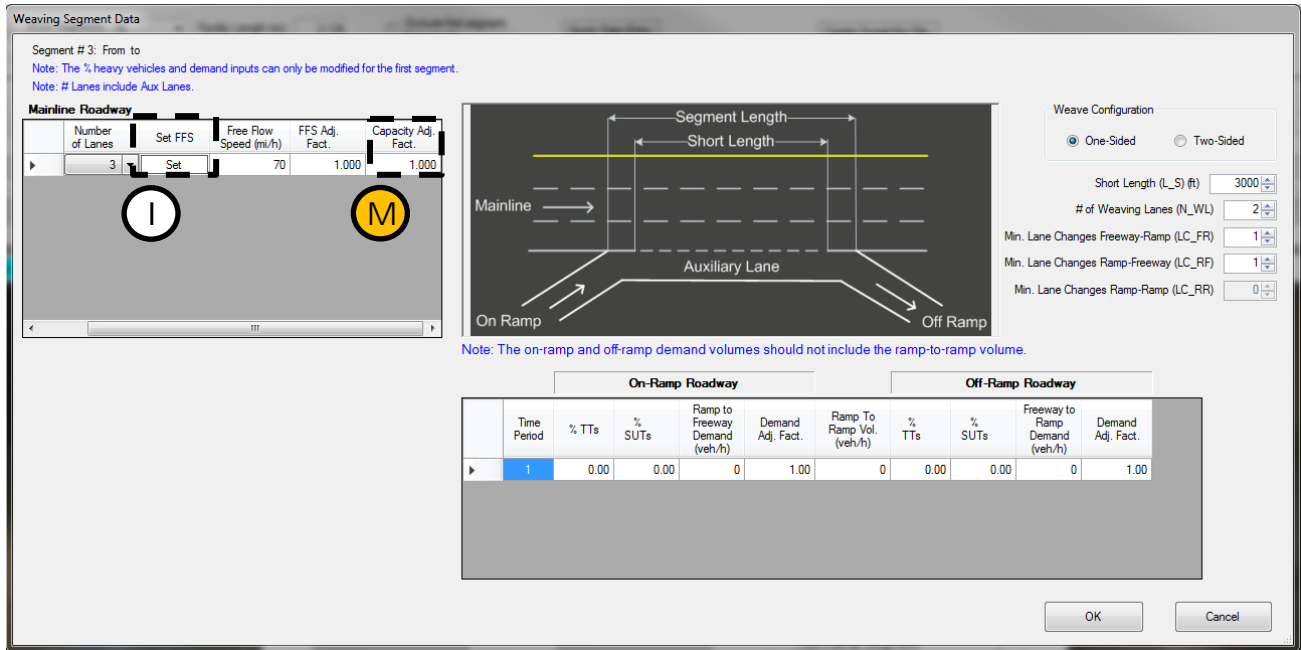
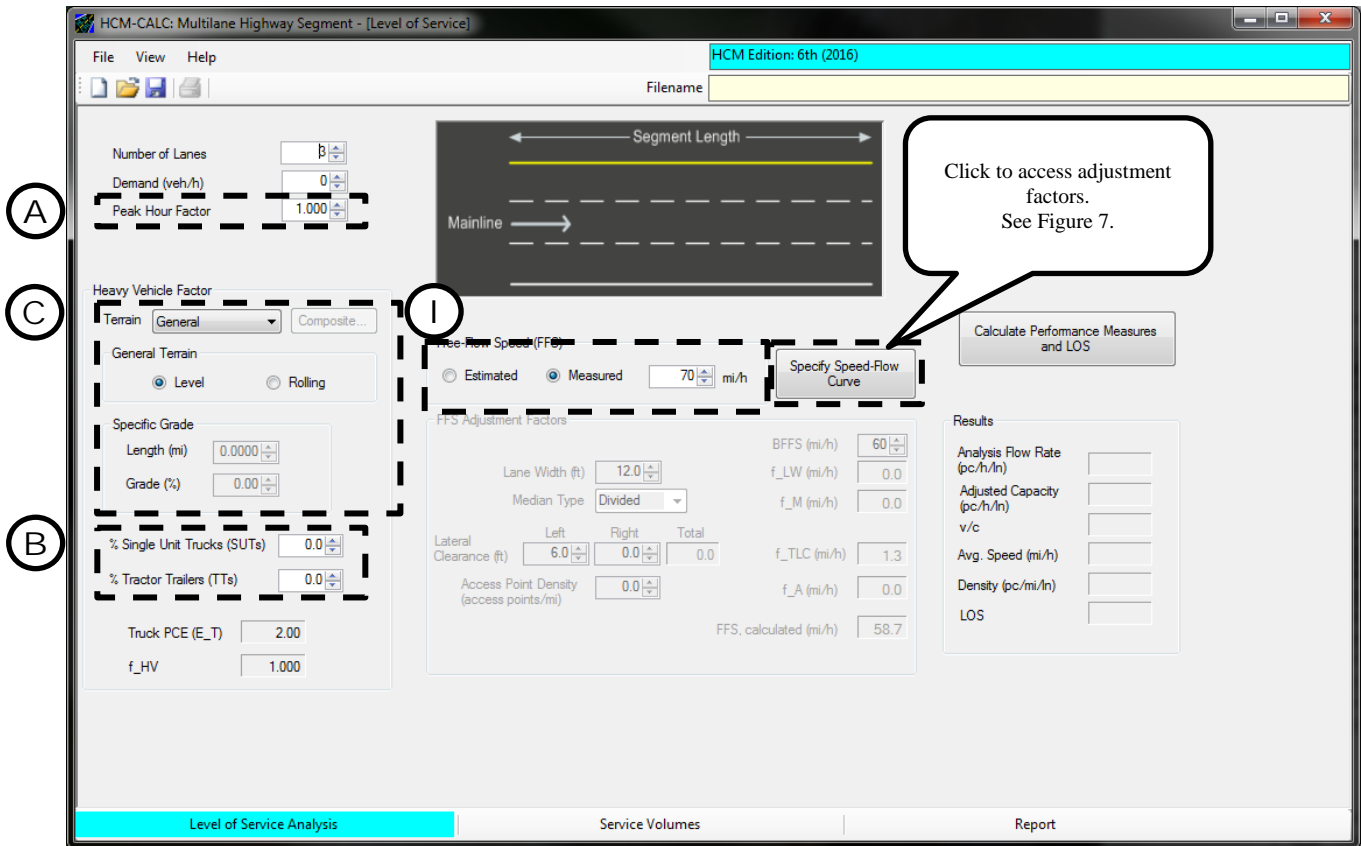


Figure 15. Weaving Segment Window within the Facility Analysis in HCM-Calc



Multilane Highway Segment Analysis

Figure 16. Multilane Highway Segment Window within the Facility Analysis in HCM-Calc



FREEVAL Software Guidance

The [FREEVAL-OR](#) software tool has been customized to incorporate all the Oregon-specific default values identified in the APM. A drop down menu (Figure 17) is available to apply the ODOT default values for a new facility, which are then translated into the global settings screen (Figure 18). The following guidance is based on FREEVAL+ OR version REL 20180627.

The guidance below highlights the location of FREEVAL input fields and notes the corresponding Oregon-specific default values. This section is organized based on freeway facilities analysis available in FREEVAL. While FREEVAL can support segment analysis, it is done in the context of a facility. Oregon default values are noted using letters **(A)** through **(M)** in the screen captures and correspond to the first column of Table 1. The user should refer to the Highway Capacity Manual 6th Edition for inputs not noted in Figures 17-20.

Since FREEVAL implements the freeway facilities analysis, the ODOT default for peak hour factor (**(A)**) is not used (all entries are in 15 minute intervals for the facility method).

Truck percentage (**(B)**) is divided into Single Unit Truck (SUT) and Tractor Trailer (TT) values. These can be specifically entered, but are also automatically populated based on the Area Type (**(D)**) from Table 1. The Driver Population speed and capacity adjustment factors (**(F)**) are also automatically updated based on the Area Type selection.

A tool for computing proportional ramp to ramp demands for weaving segments (Figure 19) can be accessed using the *Analyze->Demand Editor/Visualizer* option in the top menu bar.

The default bottleneck capacities for Oregon can be viewed and applied using the capacity tool (Figure 20) accessed using the *Analyze->Apply/Edit Default Parameters* option in the top menu bar.

Figure 17. Initial Prompt to Pre-select ODOT Defaults Over the HCM Defaults in FREEVAL

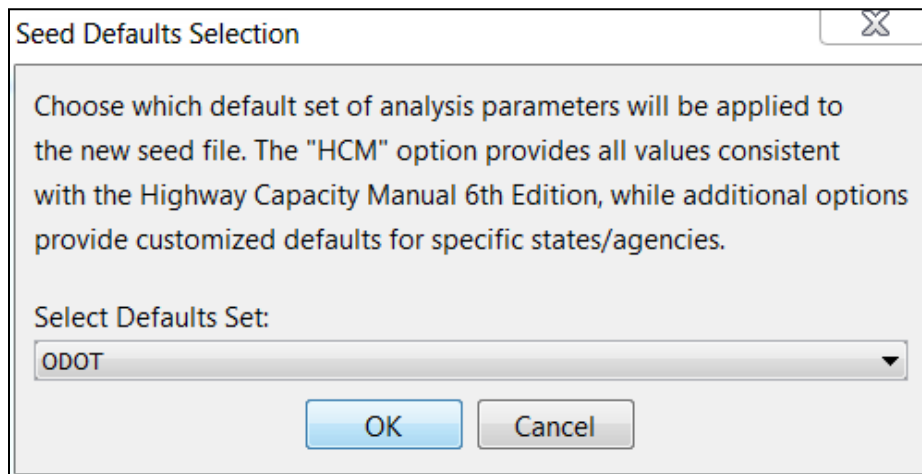


Figure 18. Project Seed Global Defaults in FREEVAL

Project Properties (ODOT Defaults)

General Information

Project Name: New Project 1
 Study Period Start Time (hh:mm): 17:00
 Seed Calibration Date: Nov 7, 2017
 Capacity Drop due to Breakdown (%): 7
 Area Type: Small Urban

Number Of HCM Segments: 7
 Study Period End Time (hh:mm): 18:00
 Jam Density (pc/mi/ln): 190
 GP Vehicle Occupancy (p/veh): 1.0

Analysis Options

Free Flow Speed Known
 Managed Lanes Analysis

Prefill Global Values

General Purpose Segments

General Terrain: Level (Default=2.0)
 Num Of Mainline Lanes: 3
 Lane Width (ft):
 Num Of Ramp Lanes: 1
 Ramp Acceleration Length (ft): 750
 Single Unit Trucks and Buses (%): 5.0
 Driver Population CAF: 0.968

Current Truck PCE: 2.0
 Mainline FFS (mph): 70
 Lateral Clearance (ft):
 Ramp FFS (mph): 35
 Ramp Deceleration Length (ft): 500
 Tractor Trailers (%): 5.0
 Driver Population SAF: 0.975

Buttons: OK, Cancel

Figure 19. FREEVAL Weave Ramp to Ramp Demand Tool

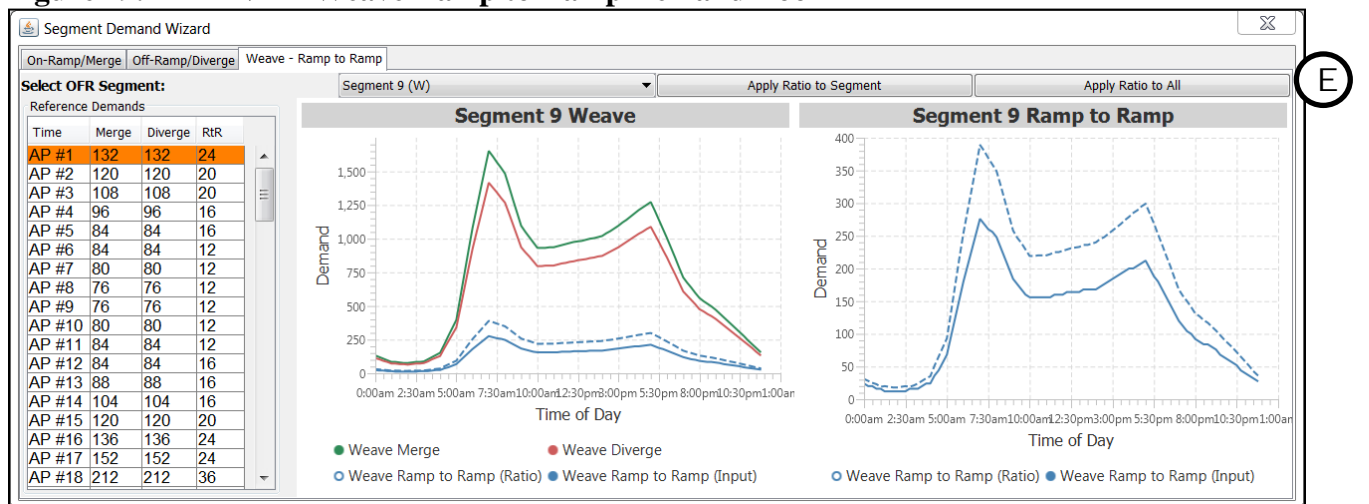


Figure 20. Default Bottleneck Capacity Input Window in FREEVAL

View/Apply Capacity Defaults

Use the table below to define pre-breakdown capacities for the specified segment types. The capacities will be converted to Capacity Adjustment Factors (CAFs) and applied to the seed file. The dropdown box can be used to select a set of default values as a starting point.

Utilize Default Capacities for Segments Oregon ▾

Pre-Breakdown Capacity (pc/hr/ln)

Segment Type	3 Lanes	2;>3 Lanes
Urban Merge	2100	2000
Urban Diverge	2100	2000
Urban weaving	2200	2100
Rural Merge	1900	1800
Rural Diverge	1900	1800

Save Cancel

ODOT Default Values for Reliability

The following sections highlight updates to [FREEVAL-OR](#) for the inclusion of Oregon-specific default values for the Highway Capacity Manual's (HCM) reliability analysis approach for the freeway facilities methodology.

Required Data and Units	Source	Suggested Default Value
(A) Seed Date	N/A	Date the seed analysis represents (Seasonal average day if not calibrated to specific date)
(B) Reliability Reporting Period (RRP) Dates	N/A	Jan. 1 st 20XX – Dec. 31 st 20XX
(C) Event Types	N/A	General Purpose Incidents, Weather, and Work Zones (as applicable)
(D) Random Number Generator Seed	N/A	
(E) Realizations per Demand-Combination	HCM 6 th	4 – Approximates number of weekdays per month
(F) Days of Week Included	HCM 6 th	Monday – Friday (All Weekdays)
(G) Days to Exclude	N/A	None
(H) Daily Demand Multipliers	ODOT	Regional-specific value (see ODOT APM Chapter 11 Appendix C)
(I) Dates Active	N/A	Analysis-specific values
(J) Segments Active	N/A	Analysis-specific values
(K) Daily Time Active	N/A	Analysis-specific values
(L) Work Zone Configuration	N/A	Analysis-specific values
(M) Incident Frequencies	N/A	Analysis-specific values
(N) Incident Severity Distribution	N/A	Analysis-specific values
(O) Incident Severity Durations	HCM 6 th	Location-specific values (see ODOT APM Chapter 11 Appendix C)
(P) Incident Adjustment Factors	HCM 6 th	Highway Capacity Manual defaults
(Q) Monthly Weather Severity Distribution	HCM/ NOAA Data	Location-specific values (see ODOT APM Chapter 11 Appendix C)
(R) Weather Severity Durations	HCM/ NOAA Data	Location-specific values (see ODOT APM Chapter 11 Appendix C)
(S) Weather Severity Adjustments	HCM 6 th	Highway Capacity Manual defaults

General Project Properties

Scenario Generator - New Project 1

Properties: GP - Demand | GP - Work Zones | GP - Incidents | Weather

Reliability Analysis Properties

Seed Date: ... RRP Start Date: ... RRP End Date: ...

Include Event Types

GP - Work Zones GP - Incidents Weather ML - Incidents

Random Number Generator (RNG) Seed Options (Any new RNG Seed value will be saved to the seed file)

Use new random RNG seed
 Use user specified RNG seed
 Use previous used RNG seed

Number of Demand Combination Realizations

Number of realizations (default 4):

Demand

Scenario Generator - New Project 1

Properties GP - Demand GP - Work Zones GP - Incidents Weather

Days in RRP

- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday
- Sunday

Select All

Select Weekdays

Select Weekends

Daily Demand Multipliers

	Monday	Tuesday	Wednesday	Thursday	Friday
January	1.0	1.0	1.0	1.0	1.0
February	1.0	1.0	1.0	1.0	1.0
March	1.0	1.0	1.0	1.0	1.0
April	1.0	1.0	1.0	1.0	1.0
May	1.0	1.0	1.0	1.0	1.0
June	1.0	1.0	1.0	1.0	1.0
July	1.0	1.0	1.0	1.0	1.0
August	1.0	1.0	1.0	1.0	1.0
September	1.0	1.0	1.0	1.0	1.0
October	1.0	1.0	1.0	1.0	1.0
November	1.0	1.0	1.0	1.0	1.0
December	1.0	1.0	1.0	1.0	1.0

Use Defaults

National Defaults Urban Saved Facility Specific User Input Values

Exclude Specific Calendar Dates From RRP

Specific Date

Jul 4, 2018

Add

Remove

Remove All

Dates Excluded From RRP

Generate Scenarios Only Generate and Run Scenarios Cancel

ODOT Default Demand Multipliers

The HCM provides two default sets of daily and season demand multipliers for urban and rural freeways. To supplement these, 11 new distinct sets of demand multipliers have been developed to represent the national and state highway system of Oregon. The new demand multiplier types are designated by thematic trend and guidance on which type applies to which section of roadway can be found in Chapter 11 Appendix C. The Oregon specific types are as follows:

- Agricultural.
- Coastal Destination.
- Coastal Destination Route.
- Commuter.
- Interstate—Nonurbanized.
- Interstate—Urbanized.
- Recreational—Summer.
- Recreational—Summer and Winter.
- Recreational—Winter.
- Summer.
- Summer < 2,500 AADT.

These have been incorporated directly into FREEVAL’s reliability scenario generation functionality. A new option to choose between the national and Oregon-specific defaults is presented to the user as seen in Figure 21.

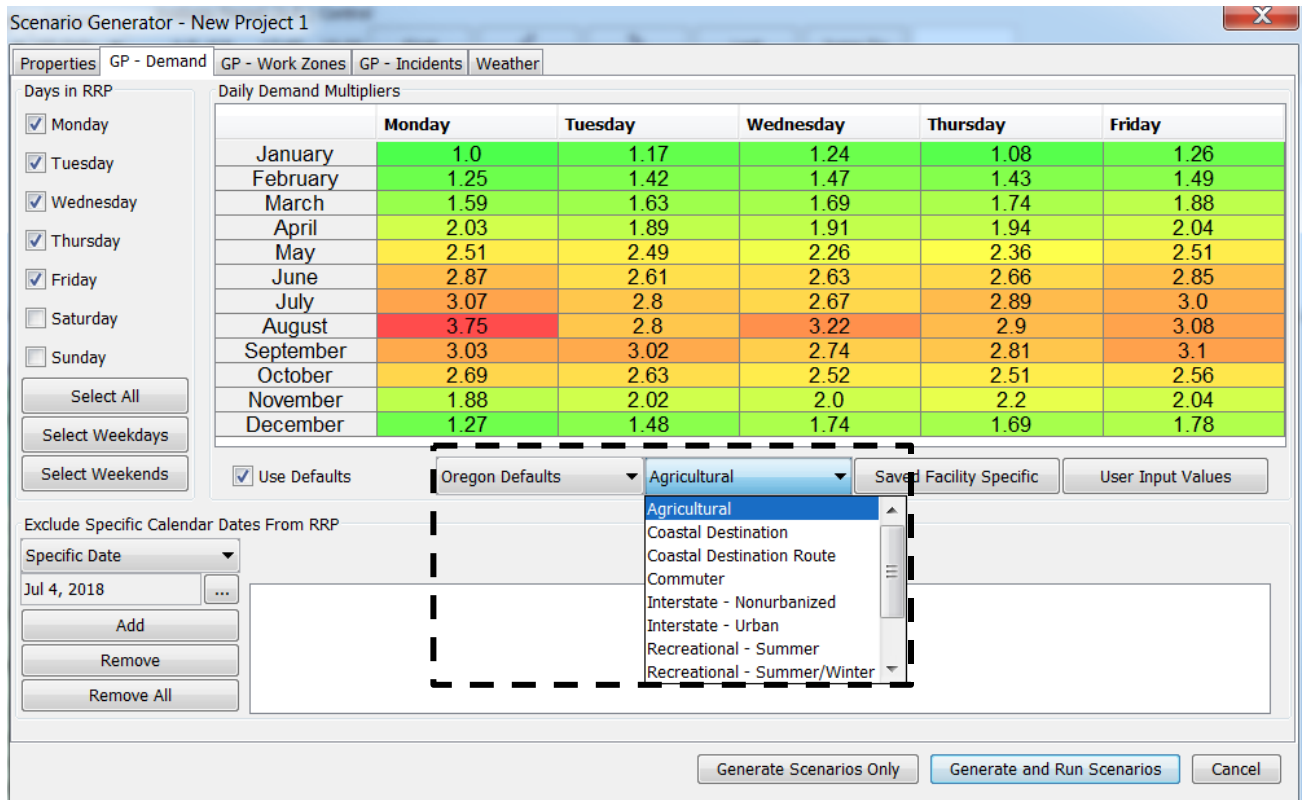
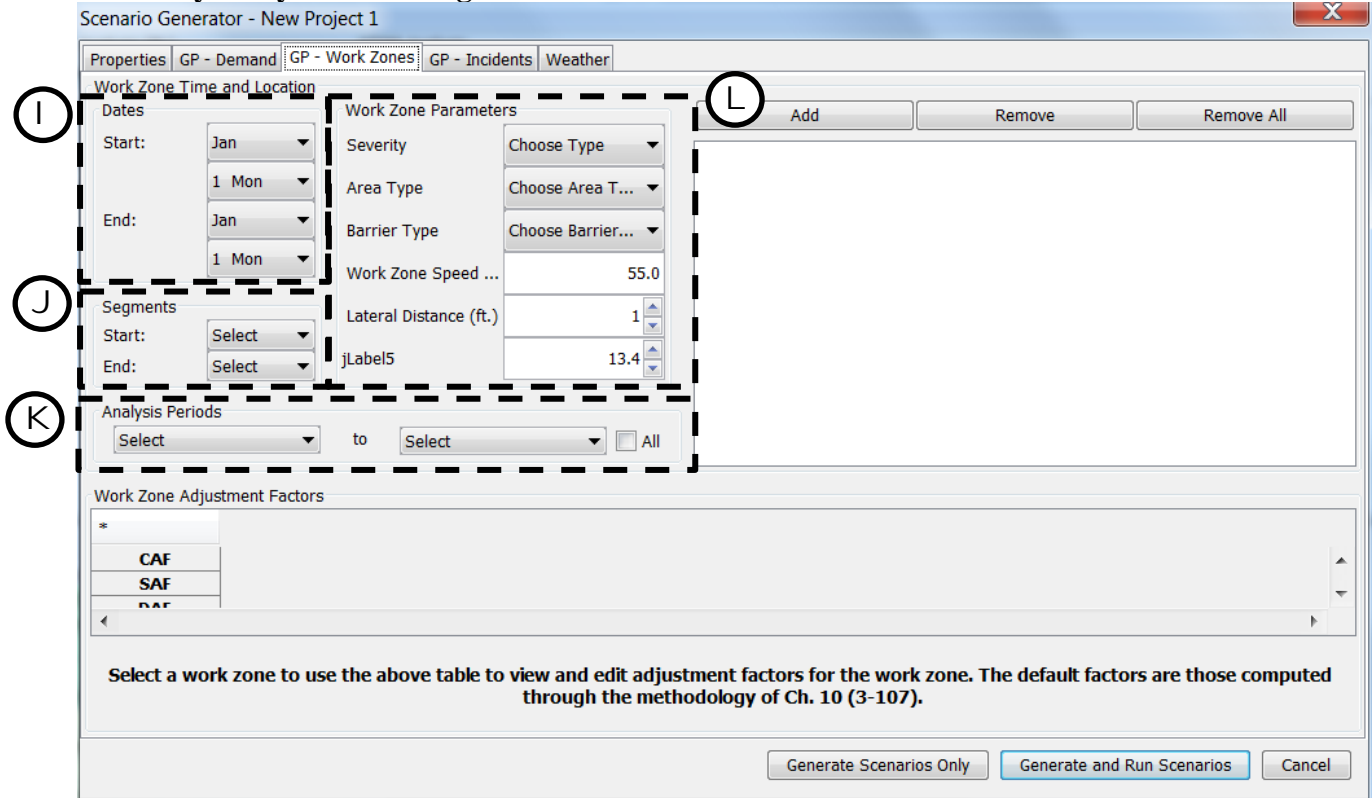


Figure 21 Screenshot of FREEVAL’s demand options configuration window for the reliability analysis scenario generator.



Incidents

There are no available Oregon-specific defaults for the incident rates, durations, and operational adjustments of the reliability analysis method. These values are highly dependent on geometric aspects of a given facility, and as such should be developed on an individual basis. There are three methods to compute incident rates within FREEVAL, and guidance on which approach to use is available in Chapter 11. Further, while a default severity type distribution is provided, it is highly recommended that these values be set for each specific analysis. One example to demonstrate the importance of this, is that the default distribution includes a percentage for three-lane closure incidents, which are only possible on four-lane freeway segments (the HCM method requires that at least one lane is always open). If no segment of a facility has at least 4-lanes, then this percentage of incidents cannot be assigned. In order for the full number of incidents to be assigned, it is critical that a user update this distribution to appropriately reflect a realistic incident severity distribution.

Scenario Generator - New Project 1

Properties | GP - Demand | GP - Work Zones | GP - Incidents | Weather

M Incident Frequencies

Month	Frequency
Jan	0.00
Feb	0.00
Mar	0.00
Apr	0.00
May	0.00
Jun	0.00
Jul	0.00
Aug	0.00
Sep	0.00

Calculate Frequencies...
Use Seed File Values

Frequencies represent the number of incidents per study period per month.
A red background indicates that the frequency values have not been set or are very small (<0.01)

N Incident Durations

Incident Severity	Distribution %	Mean Duration	Std. ...	Minimum Duration	Maximum Duration
Shoulder Closure	75.4	34.0	15.1	8.7	58.0
One Lane Closure	19.6	34.6	13.8	16.0	58.2
Two Lane Closure	3.1	53.6	13.9	30.5	66.9
Three Lane Closure	1.9	67.9	21.9	36.0	93.3
Four Lane Closure	0.0	67.0	21.0	36.0	93.3

Use National Default Data | Use Default Durations
Use Saved Seed File Distribution | Use Saved Seed File Durations

P Adjustment Factors

Capacity Adjustment Factors (CAFs)

Segment Lanes	Shoulder Closure	1 Lane Closure	2 Lane Closure	3 Lane Closure	4 Lane Closure
2	0.81	0.7			
3	0.83	0.74	0.51		
4	0.85	0.77	0.5	0.52	

FFS Adjustment Factors (SAFs)

Segment Lanes	Shoulder Closure	1 Lane Closure	2 Lane Closure	3 Lane Closure	4 Lane Closure
2	1.0	1.0			
3	1.0	1.0	1.0		
4	1.0	1.0	1.0	1.0	

Demand Adjustment Factors (DAFs)

Segment Lanes	Shoulder Closure	1 Lane Closure	2 Lane Closure	3 Lane Closure	4 Lane Closure
2	1.0	1.0			
3	1.0	1.0	1.0		
4	1.0	1.0	1.0	1.0	

Lane Adjustment Factors

Segment Lanes	Shoulder Closure	1 Lane Closure	2 Lane Closure	3 Lane Closure	4 Lane Closure
2	0	-1			
3	0	-1	-2		
4	0	-1	-2	-3	

Generate Scenarios Only | Generate and Run Scenarios | Cancel

Weather

Scenario Generator - New Project 1

Properties | GP - Demand | GP - Work Zones | GP - Incidents | Weather

Please enter probabilities, durations, and adjustment factors for weather events, or fill by specifying the nearest metropolitan area:

Use the dropdown selection boxes to choose a region and city.

National | Extract Historic Regional Weather Data | Import from File
New Facility Specific | Use Values Stored In Seed | Export to File

Q

	Med Rain	Heavy Rain	Light Snow	LM Snow	MH Snow	Heavy Snow	Severe Cold	Low Vis	Very Low Vis	Min Vis	Normal Weather
January	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
February	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
March	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
April	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
May	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
June	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
July	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
August	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
September	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

R

	Med Rain	Heavy Rain	Light Snow	LM Snow	MH Snow	Heavy Snow	Severe Cold	Low Vis	Very Low Vis	Min Vis	Normal Weather
Avg Dur (mi)	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
CAF	0.93	0.86	0.96	0.91	0.89	0.78	0.92	0.90	0.88	0.90	1.00
SAF	0.93	0.92	0.87	0.86	0.84	0.83	0.93	0.94	0.92	0.92	1.00

S

Generate Scenarios Only | Generate and Run Scenarios | Cancel

ODOT Specific Weather Data

In addition to the 98 default weather locations provided by the HCM 6th edition, new Oregon-specific weather defaults were developed for 12 additional locations. As with the demand multipliers, these have been incorporated directly into FREEVAL's reliability scenario generation interface. A user can toggle between the national and Oregon-specific options, which then allows for additional selection of the specific location as a secondary option. Figure 22 shows the location of these new options within the software.

Figure 22 Example selection of the Oregon specific default weather station locations.

Scenario Generator - New Project 1

Properties | GP - Demand | GP - Work Zones | GP - Incidents | **Weather**

Please enter probabilities, durations, and adjustment factors for weather events, or fill by specifying the nearest metropolitan area:

Use the dropdown selection boxes to choose a region and city.

Oregon
New Facility Specific
New Facility Specific
Troutdale,OR
Eugene,OR
Salem,OR
Medford,OR
Roseburg,OR
Sexton Summit,OR
Hermiston,OR

Extract Historic Regional Weather Data
Import from File
Use Values Stored In Seed
Export to File

	Med Rain	Heavy Rain	Severe Cold	Low Vis	Very Low Vis	Min Vis	Normal Weather
January	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
February	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
March	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
April	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
May	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
June	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
July	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
August	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
September	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

	Med Rain	Heavy Rain	Light Snow	LM Snow	MH Snow	Heavy Snow	Severe Cold	Low Vis	Very Low Vis	Min Vis	Normal Weather
Avg Dur (mi)	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	
CAF	0.93	0.86	0.96	0.91	0.89	0.78	0.92	0.90	0.88	0.90	1.00
SAF	0.93	0.92	0.87	0.86	0.84	0.83	0.93	0.94	0.92	0.92	1.00

Generate Scenarios Only | Generate and Run Scenarios | Cancel