## INTEROFFICE COMMUNICATION

то:	Bob Weaver, P.E, P.S, District 3 Deputy Director
ATTENTION:	Scott Ockunzzi, P.E., District 3 Planning Engineer
FROM:	Adam Koenig, P.E., Administrator, Office of Roadway Engineering
BY:	Mary Bapu-Tamaskar, P.E., Studies Engineer, Office of Roadway Engineering
DATE:	September 18, 2023
SUBJECT:	LOR-90-10.76 IOS Approval, PID 107714

The Office of Roadway Engineering has reviewed the LOR-90-10.76 Interchange Operations Study. The study formalizes the TSMO project to add mainline capacity along I-90/SR2, resulting in 3-lanes along each direction of travel between the SR2 & I-90 split (on the west side) to the I-90 & SR611 interchange (on the east side). In addition, this study analyzes options to terminate and initiate the 3<sup>rd</sup> lane on the west side of the project at the SR2 and I-90 split. For the WB I-90 direction, Option #2 is proposed. In the EB direction, the "Alternate EB I-90 Configuration", is proposed; the 3<sup>rd</sup> EB lane is formed as an add lane from I-90. ORE concurs with the recommendations of the study.

The study meets ODOT requirements for an Interchange Operation Study and is, therefore, approved. If you have any questions, please contact Mary Bapu-Tamaskar at 614-644-7888.

E-SIGNED by Adam Koenig on 2023-09-18 17:02:03 GMT

AHK: MBT

cc: J. Cichello (D3) - K. Wade (D3)



# **INTERCHANGE OPERATIONS STUDY**

LOR-90-10.76

INTERSTATE 90 AND STATE ROUTE 2 INTERCHANGE

ODOT DISTRICT 3 STUDY PID 107714

AUGUST 30, 2023

PREPARED FOR:

ODOT DISTRICT 3 906 N. CLARK AVENUE ASHLAND, OHIO 44805

PREPARED BY:

CRAWFORD, MURPHY & TILLY, INC. 8101 N. HIGH STREET SUITE 150 COLUMBUS, OH 43235







### TABLE OF CONTENTS

PROJECT SUMMARY 1
STUDY AREA 1
HCS Analysis Locations
Figure 1: I-90 at SR-2 Preferred Alternative (Option 2 from TSMO Study)
BACKGROUND
Figure 2: Study Area Map with Analysis Point
Existing Conditions6
Figure 4: WB I-90 / SR-2 East of Interchange6 Figure 5: WB SR-2 Bridge Location7
TRAFFIC ANALYSES
Traffic Volumes and Analyses8
Table 1: HCM LOS Criteria    8
Freeway Analysis9
Figure 6: Alternate EB I-90 Configuration Schematic
CONCLUSIONS

APPENDIX A: Certified Traffic Volumes

APPENDIX B: HCS Capacity Analysis

APPENDIX C: TransModeler Capacity Analysis

PROJECT SUMMARY	
Location:	Interstate 90 and State Route 2 Interchange, Loraine County, Ohio
PID:	107714
Study Sponsor:	ODOT District 3

#### Proposed Work:

In addition to the proposed add-lane project (PID 107714) that converts I-90 into a 6-lane section from the State Route 611 (SR 611) to the State Route 2 (SR 2) interchanges, the following Option 2 configuration as outlined in a previous TSMO study is recommended as the preferred alternative for the WB I-90 at SR-2 interchange. A conceptual layout of the proposed work can be seen in **Figure 1**.

- Right-most (shoulder) lane continues to WB SR-2
- Middle lane is an option lane that can continue to WB SR-2 or exit to WB I-90
- Left-most (median) lane is an exit-only drop lane to WB I-90

The TSMO study assumes that the third EB I-90 lane would be added to the median starting on the bridge over Lake Ave. An alternate configuration is proposed such that EB I-90 ramp forms a third lane on EB I-90. The existing EB SR-2 lanes (2) become the middle and new inside EB lanes on I-90.

#### STUDY AREA

Both I-90 and SR-2 are east-west routes located in the northern part of Lorain County that connects Erie and Cuyahoga counties, crossing multiple cities and providing access to Ohio Turnpike. The study area is from west of the I-90 and SR-2 interchange to east of the I-90 and SR-611 interchange.

#### HCS ANALYSIS LOCATIONS

#### **Basic Freeway Analysis**

- EB / WB I-90 west of I-90 at SR-2 Interchange
- EB / WB SR-2 west of I-90 at SR-2 Interchange
- EB I-90 between SR-2 and SR-57 Interchanges
- EB / WB I-90 below SR-57
- EB / WB I-90 between SR-57 and SR-254 Interchanges
- EB / WB I-90 below SR-254
- EB / WB I-90 between SR-254 and SR-611 Interchanges
- EB / WB I-90 below SR-611 (2-lane section, No Build)
- EB / WB I-90 below SR-611 (3-lane section)
- EB / WB I-90 east of SR-611

FIGURE 1: I-90 AT SR-2 PREFERRED ALTERNATIVE (OPTION 2 FROM TSMO STUDY)



Note: Graphics courtesy of October 2021 TSMO study

#### Ramp Analysis

- EB I-90 and EB SR-2 Merge (Merge Analysis)
- EB I-90 exit ramp to SR-57 (Diverge Analysis)
- EB I-90 between SR-2 and SR-57 (Weave Analysis, Build)
- EB I-90 entrance ramp from SR-57 (Merge Analysis)
- EB I-90 exit ramp to SR-254 (Diverge Analysis)
- EB I-90 entrance ramp from SR-254 (Merge Analysis)
- EB I-90 exit ramp to SR-611 (Diverge Analysis)
- EB I-90 entrance ramp from SR-611 (Merge Analysis)
- WB I-90 exit ramp to SR-611 (Diverge Analysis)
- WB I-90 entrance ramp from SR-611 (Merge Analysis)
- WB I-90 exit ramp to SR-254 (Diverge Analysis)
- WB I-90 entrance ramp from SR-254 (Merge Analysis)
- WB I-90 exit ramp to SR-57 (Diverge Analysis)
- WB I-90 between SR-57 and SR-2 (Weave Analysis)

A study area map in **Figure 2** shows the analysis locations above for the study.

#### BACKGROUND

The section of I-90 between SR-2 and SR-611 was identified as the highest need freeway segment in District 3 according to the Traffic Operations Assessment Systems Tool (TOAST). The section has a substandard TOAST score between 34.8% and 44.3%. A TSMO study dated October 2021 recommended widening of I-90 to 6-lanes within the project limits. The SR-2 interchange is located on the west end of the proposed add-lane project (PID 107714). The east terminus is where the existing 6-lane section ends/begins at the SR-611 interchange.

The TSMO study assumes that the third EB I-90 lane would be added to the median starting on the bridge over Lake Ave 2,100 ft east of the SR-2 interchange. Three interchange alternatives on WB I-90 at SR-2 interchange were also evaluated in the TSMO study as depicted in **Figure 3**.

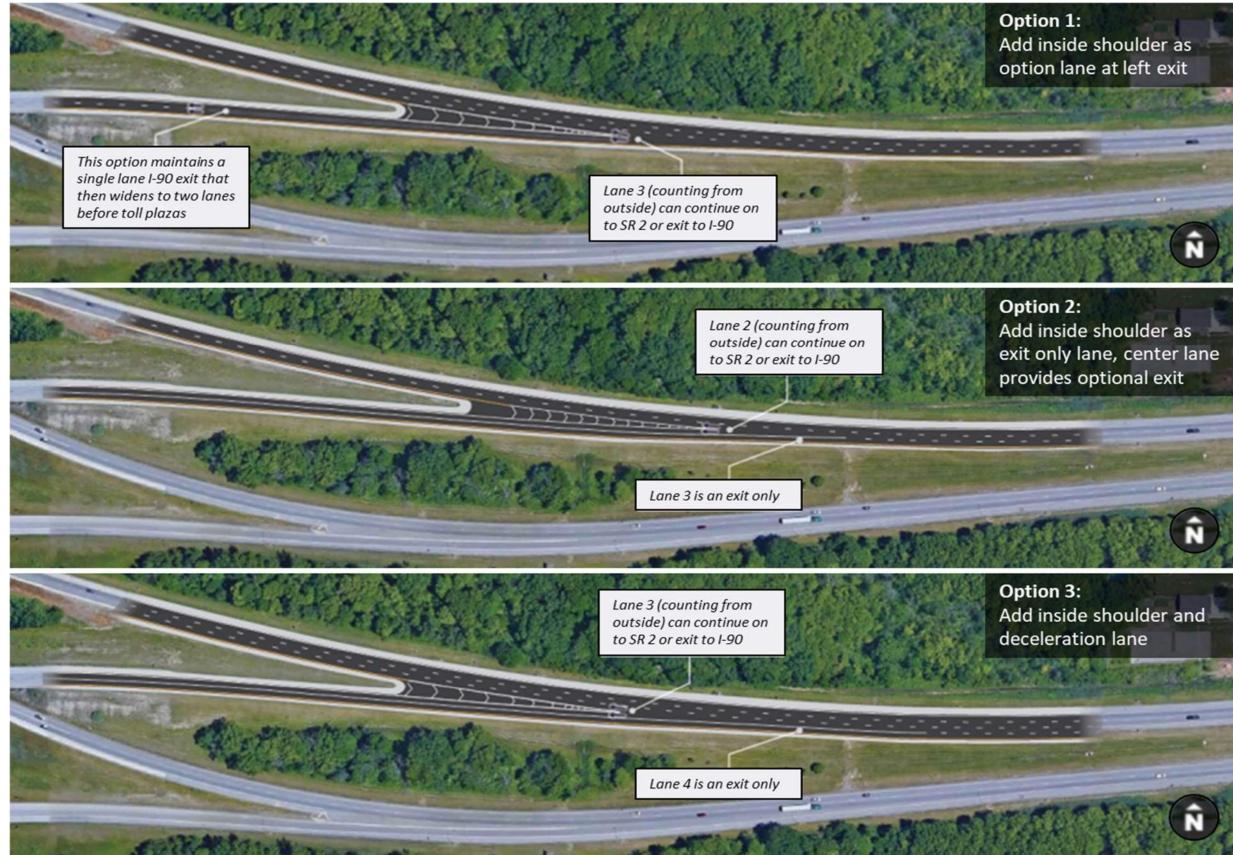
- Option 1: Three lanes on WB I-90 with 3 lanes destined to WB SR-2 and one deceleration lane to WB I-90
- Option 2: Three lanes on WB I-90 with 2 lanes destined to WB SR-2 and 2 lanes destined to WB I-90 (one option lane and a drop lane to WB I-90)
- Option 3: Four lanes on WB I-90 with 3 lanes destined WB SR-2 and 2 lanes destined to WB I-90 (one option lane and a drop lane to WB I-90). The 4<sup>th</sup> lane is assumed to be an add lane from WB SR-57 entrance ramp.

#### FIGURE 2: STUDY AREA MAP WITH ANALYSIS POINTS



\*Basic freeway analysis performed for both 2-lane and 3-lane sections of I-90 under SR-611 in the No-Build condition

#### FIGURE 3: WB I-90 AT SR-2 INTERCHANGE ALTERNATIVES



Note: Original graphics courtesy of October 2021 TSMO study

The goal of this Interchange Operations Study (IOS) is to identify the preferred lane configuration of the I-90 and SR-2 interchange and to document operations of the existing interchanges within the study limits for Build and No-Build conditions at design year 2045. In addition, an IOS is required when changing lane configurations at a ramp intersection approach or when changing the traffic control type at a ramp intersection.

#### EXISTING CONDITIONS

I-90 within the study area is an urban four-lane divided freeway from the SR-611 interchange to the SR-2 interchange with two lanes in each direction separated by a grass median. The section east of the SR-611 bridge is a six-lane divided freeway also separated by a grass median. The freeway has a posted speed limit of 65 mph and includes other grade-separated interchanges. In the westbound direction, WB I-90 diverges at the west end of the study limits and becomes a toll facility (Ohio Turnpike with I-80. The majority of SR-2 west of the study area is an urban four-lane divided freeway with two lanes in each direction separated by a grass median. The existing lane configuration of the WB I-90 at the SR-2 interchange is as follows:

- One lane (right lane) destined to WB SR-2
- An option lane (left lane) to either WB I-90 or to WB SR-2.

Figure 4 shows WB approach in advance of the interchange.



#### FIGURE 4: WB I-90 / SR-2 EAST OF INTERCHANGE

In the eastbound direction, an EB I-90 lane merges with two EB SR-2 lanes at the west end of the study limits. **Figure 5** shows EB merge section at the interchange.



#### FIGURE 5: EB I-90 / SR-2 EAST OF INTERCHANGE

A 44 feet wide bridge on WB SR-2 exists over Murray Ridge Rd having two WB lanes and left/right shoulders that is approximately 2,500 feet west of the existing WB I-90 at SR-2 interchange gore. Note the required taper length from a 3-lane to a 2-lane section per OMUTCD Section 3B.02 is calculated at 780 feet, therefore no bridge reconstruction is expected for any of the TSMO alternatives. See **Figure 6** for the bridge location.

#### FIGURE 6: WB SR-2 BRIDGE LOCATION



#### TRAFFIC ANALYSES

Options 2 and 3 identified in the October 2021 TSMO study were evaluated due to the option lane offered by both alternatives for two reasons:

- An option lane at the SR-2 interchange reduces weaving of SR-57 traffic destined to I-80.
- Confirm the need for three lanes destined to WB SR-2.

The location for the added third EB I-90 lane assumed in the TSMO study was also evaluated.

#### TRAFFIC VOLUMES AND ANALYSES

Opening year (2025) and design year (2045) certified traffic Design Hourly Volume (DHV) plates dated January 27<sup>th</sup>, 2022 developed for the TSMO study were used for analyses. Note that the Build volumes are different and higher than the No-Build volumes. The certified traffic plates can be found in **Appendix A**.

Capacity analyses of the 2045 design year No-Build and Build conditions were performed using the Highway Capacity Manual (HCM) 7<sup>th</sup> Edition (Transportation Research Board, 2022). Highway Capacity Software 2023 was used for all capacity analyses. **Table 1** shows the HCM level of service (LOS) thresholds for freeway facilities and each corresponding segment (basic, merge/diverge, and weave) included in the study area.

Level of Service	Urban Freeway Facilities	Basic Freeway Segment	Merge & Diverge Segment	Weave Segment
(LOS)	Density (pc/mi/ln)	Density (pc/mi/ln)	Density (pc/mi/ln)	Density (pc/mi/ln)
Α	0-11	0-11	0-10	0-10
В	>11-18	>11-18	>10-20	>10-20
С	>18-26	>18-26	>20-28	>20-28
D	>26-35	>26-35	>28-35	>28-35
E	>35-45	>35-45	>35	>35-43
F	>45 or	>45 or	Demand Exceeds	>43 or Demand
Г	V/C ratio > 1.00	V/C ratio > 1.00	Capacity	Exceeds Capacity

#### TABLE 1: HCM LOS CRITERIA

#### FREEWAY ANALYSIS

HCS 2023 software was utilized to analyze the freeway facility including basic freeway, merge/diverge, and weave segments on I-90 and SR-2. Capacity analysis results for TSMO Options 2 and 3 are the same for EB I-90 since both alternatives share the same improvements. In addition, the operations of I-90 west of the SR-2 interchange in both directions are the same for the No-Build and Build conditions since there are no changes to the existing configuration.

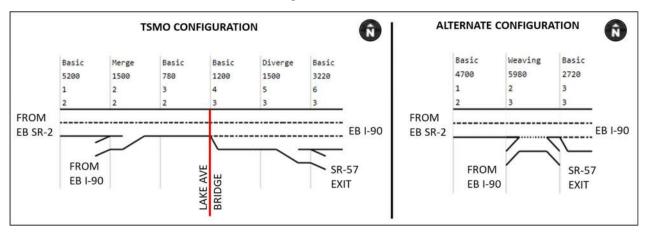
EB I-90 configuration between the SR-2 interchange and the SR-57 interchange assumed in the TSMO study was analyzed such that the 3-lane section starts on the bridge over Lake Ave, resulting in a 780 ft 2-lane basic segment east of the I-90 and SR-2 merge segment, followed by a 1,200 ft 3-lane basic segment. An alternate configuration is analyzed such that the EB I-90 ramp forms a third lane on EB I-90. The existing EB SR-2 lanes (2) become the middle and new inside EB lanes on I-90. This alternate configuration would avoid a merge condition but introduces a potential weave area between the SR-2 interchange and the SR-57 interchange. Therefore, this segment was analyzed as a 5,980 ft weave segment despite not meeting the HCM definition of a weave segment. A schematic of the alternate configuration is shown in **Figure 7**. The following assumptions were applied to the Alternate EB I-90 weave segment due to the limitations of HCS:

- Weave segment analyzed as having 2 EB I-90 lanes and 1 auxiliary lane connecting I-90 entrance ramp and SR-57 exit ramp.
- Minimum 1-lane ramp-to-freeway weave is assumed. Doing so inherently assumes all of I-90 entrance ramp traffic moves from the right EB I-90 lane to the middle EB I-90 lane.

HCS segment diagrams for the TSMO study and alternate configuration are shown in **Figure 8**. Operations of EB I-90 segments east of SR-57 are the same between the TSMO and Alternate configurations since the two alternatives share the same improvements (convert 2-lane to 3-lane) at these locations.



#### FIGURE 7: ALTERNATE EB I-90 CONFIGURATION SCHEMATIC

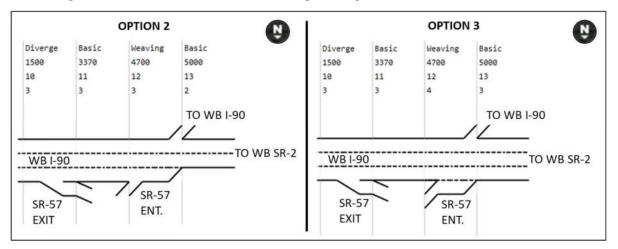


#### FIGURE 8: TSMO AND ALTERNATE EB I-90 HCS SEGMENT DIAGRAMS

The WB I-90 segment between the SR-2 interchange and the SR-57 interchange is a conventional merge (SR-57) followed by a basic segment and a major diverge (SR-2). Although WB I-90 between these interchanges does not meet the HCM definition of a weave segment, it is analyzed as a 5,300 ft weave for the No-Build, Option 2, and Option 3 conditions to verify any potential problems caused by weaving type movements from SR-57 to the SR-2 / I-90 split. The following assumptions were applied to the capacity analyses due to the limitations of HCS:

- The option lane in Options 2 and 3 is not modeled in the analyses.
- Option 2 analyzed as having a minimum 1-lane ramp-to-ramp weave. Doing so inherently assumes that all of traffic coming from SR-57 uses the option lane to travel to WB I-90.
- Option 3 analyzed as having a minimum 2-lane ramp-to-ramp weave. Doing so inherently assumes that all of traffic coming from SR-57 uses the option lane to travel to WB I-90.

HCS segment diagrams for Options 2 and 3 are shown in **Figure 9**. Note that the minimum number of ramp-to-ramp lanes modeled in HCS is not graphically shown in the segment diagrams. Operations of WB I-90 segments east of SR-57 are the same between Options 2 and 3 since the two alternatives share the same improvements (convert 2-lane to 3-lane) at these locations.



#### FIGURE 9: TSMO OPTION 2 AND OPTION 3 WB I-90 HCS SEGMENT DIAGRAMS

The free flow speed of 70 mph (speed limit +5 mph) is assumed on I-90 and SR-2 based on guidance from OATS Section 4.6. A ramp free flow speed of 55 mph is assumed. Per guidance on OATS Section 5.1 level terrain is assumed since the steepest observed grade is 2.7% and occurs less than  $\frac{1}{2}$  mile on I-90 west of the SR-57 interchange.

Because Peak Hour Factors (PHF) are not provided in the certified traffic plates, PHF of 0.94 was applied to both freeway and ramp approaches following OATS Section 5.2 guidance. Truck percentages presented in the certified traffic plates were used. The results of the HCS analyses are summarized in **Table 2** and **Table 3**.

		2045 AM			2045 PM								
I-90 EB	<b>NO BUILD</b>	TSMO	ALTERNATE	<b>NO BUILD</b>	TSMO	ALTERNATE							
Faciltity Length, mi	9.01	9.01	9.01	9.01	9.01	9.01							
Space Mean Speed, mi/h	63.10	66.80	65.20	65.40	67.80	66.10							
Avg. Density, pc/mil/In	29.20	22.20	22.30	25.60	19.80	19.90							
Avg. Density, veh/mi/In	26.30	20.00	20.10	23.10	17.90	18.00							
Avg. Travel Time, min	8.60	8.10	8.30	8.30	8.00	8.20							
LOS	D	С	С	С	С	С							
I-90 WB		2045 AM		2045 PM									
1-90 WB	NO BUILD	<b>OPTION 2</b>	<b>OPTION 3</b>	<b>NO BUILD</b>	<b>OPTION 2</b>	OPTION 3							
Faciltity Length, mi	8.99	8.99	8.99	8.99	8.99	8.99							
Space Mean Speed, mi/h	67.60	68.50	68.60	56.60	65.30	66.00							
Avg. Density, pc/mil/In	19.00	14.90	13.90	34.20	25.90	23.90							
Avg. Density, veh/mi/In	17.30	13.60	12.60	31.40	23.60	21.70							
Avg. Travel Time, min	8.00	7.90	7.90	9.50	8.30	8.20							
LOS	С	В	В	F	С	С							

#### TABLE 2: 2045 NO-BUILD AND BUILD FREEWAY FACILITIES ANALYSIS SUMMARY

Supplemental TransModeler analysis for the WB I-90 segment between the SR-2 interchange and the SR-57 interchange Option 2 was performed by ODOT District 3 to verify for any potential weaving problems. The analysis shows acceptable operations (LOS C or better) in the segment. HCS reports for all freeway capacity analyses on I-90 and SR-2 can be found in **Appendix B**, and the supplemental TransModeler reports in **Appendix C**.

### TABLE 3: 2045 NO-BUILD AND BUILD FREEWAY SEGMENTS ANALYSIS SUMMARY

			2045 AM											2045 PM								
Segment (EB)	Analysis		NO BUI	LD			TSMC	)			ALTERNA	ATE			NO BUI	LD		TSM	0		ALTERN	ATE
Segment (ED)	Туре	LOS	Density	d/	/c	LOS	Density	d/	/c	LOS	Density	d/	C	LOS	Density	d/c	LOS	Density	d/c	LOS	Density	d/c
		LUS	(pc/mi/ln)	<b>F</b> *	<b>R</b> *	LUS	(pc/mi/ln)	<b>F</b> *	<b>R</b> *	LUS	(pc/mi/ln)	<b>F</b> *	<b>R*</b>	LUS	(pc/mi/ln)	F* R*	105	(pc/mi/ln)	F* R*	LUS	(pc/mi/ln)	F* R*
I-90 West of I-90/SR-2 Merge	Basic	Α	5.6	0.16	-	С	23.8	0.68	-	С	23.8	0.68	-	А	10.5	0.31 -	В	13.3	0.39 -	В	13.3	0.39 -
SR-2 West of I-90/SR-2 Merge	Basic	С	20.8	0.60	-	С	22.1	0.63	-	С	22.1	0.63	-	С	22.3	0.64	С	23.7	0.67 -	С	23.7	0.67 -
I-90/SR-2 b/w SR-2 and SR-57 (Weave)	Weave				N/	Ά				D	28.2	0.97	-			Ν	/A			С	25.0	0.79 -
I-90 at SR-2 Merge	Merge	D	33.4	0.90	0.65	Е	35.9	0.97	0.74					D	30.1	0.81 0.36	D	32.4	0.87 0.42			
I-90/SR-2 b/w SR-2 and SR-57 (2-lane section)	Basic	E	36.6	0.90	-	Е	42.1	0.97	-		N/A			D	31.5	0.83 -	D	29.1	0.78 -		N/A	
I-90/SR-2 b/w SR-2 and SR-57 (3-lane section)	Basic		N/A			С	22.6	0.65	-		N/A				N/A		С	20.4	0.59 -		IN/A	
I-90 Exit Ramp to SR-57	Diverge	E	36.1	0.90	0.51	С	26.6	0.65	0.54					D	33.0	0.83 0.52	С	26.6	0.59 0.55			
I-90 below SR-57	Basic	C	22.8	0.65	-	В	16.1	0.47	-					С	19.8	0.57 -	В	14.1	0.41 -			
I-90 Entrance Ramp from SR-57	Merge	D	31.3	0.82	0.37	С	23.1	0.59	0.39					D	28.6	0.75 0.38	С	21.3	0.53 0.40			
I-90 b/w SR-57 and SR-254	Basic	D	31.8	0.83	-	С	20.7	0.60	-					D	27.8	0.76 -	С	18.6	0.54 -			
I-90 Exit Ramp to SR-254	Diverge	D	34.0	0.83	0.28	С	24.8	0.60	0.29					D	31.0	0.76 0.30	С	23.0	0.54 0.32			
I-90 below SR-254	Basic	C	24.7	0.69	-	В	17.2	0.50	-					С	21.1	0.61 -	В	15.0	0.44 -			
I-90 Entrance Ramp from SR-254	Merge	D	32.7	0.87	0.38	С	23.9	0.62	0.40			2 14		D	29.1	0.77 0.36	С	21.5	0.55 0.38		SEE OPTI	
I-90 b/w SR-254 and SR-611	Basic	D	33.9	0.86	-	С	21.5	0.62	-		SEE OPTION 2			D	28.3	0.77 -	С	18.9	0.55 -		JEE OF II	
I-90 Exit Ramp to SR-611	Diverge	E	35.3	0.86	0.32	С	25.7	0.62	0.34					D	31.4	0.77 0.26	С	23.2	0.55 0.28			
I-90 below SR-611 (2-lane section)	Basic	С	25.7	0.72	-		N/A	-						С	22.7	0.65 -		N/A				
I-90 below SR-611 (3-lane section)	Basic	В	16.4	0.48	-	В	17.7	0.52	-					В	14.8	0.43 -	В	16.0	0.47 -			
I-90 Entrance Ramp from SR-611	Merge	С	26.7	0.68	0.67	D	30.3	0.73	0.71				С	22.8	0.59 0.52	С	26.1	0.64 0.55				
I-90 east of SR-611						-			_		С	20.9	0.60 -	С	22.7	0.65 -						

							2045 A	M										2045 P	M					
Segment (WB)	Analysis		NO BUI	LD			OPTION	N 2			OPTION 3			NO BU	LD			OPTION 2				OPTION 3		
Segment (WB)	Туре	LOS Density d/c		/c	105	Density	C	d/c	LOS	Density	d/c	LOS	Density	d/c		LOS	Density	d/c		LOS	Density	d/c		
		203	(pc/mi/ln)	<b>F</b> *	<b>R</b> *	203	(pc/mi/ln)	<b>F</b> *	<b>R</b> *		(pc/mi/ln)	<b>F* R*</b>	203	(pc/mi/ln)	<b>F</b> *	<b>R</b> *	103	(pc/mi/ln)	<b>F</b> *	<b>R</b> *		(pc/mi/ln)	<b>F* R</b> *	
I-90 east of SR-611	Basic	В	15.0	0.44	-	В	16.1	0.47	- '				D	28.4	0.77	-	D	31.7	0.83	-				
I-90 Exit Ramp to SR-611	Diverge	В	18.9	0.44	0.36	С	20.2	0.47	0.38			F	30.7	0.77	0.67	D	32.9	0.83	0.72					
I-90 below SR-611 (3-lane section)	Basic	В	11.1	0.32	-	В	11.9	0.35	5 -				F	69.6	0.56	-	С	20.7	0.60	-				
I-90 below SR-611 (2-lane section)	Basic	В	16.6	0.48	-		N/A	-					F	75.5	0.83	-		N/A	-					
I-90 Entrance Ramp from SR-611	Merge	С	22.3	0.59	0.22	В	16.2	0.42	0.24				F	F         35.1           F         38.8           F         38.2		0.38	С	27.2	0.72	0.40				
I-90 b/w SR-611 and SR-254	Basic	С	21.0	0.61	-	В	14.9	0.43	3 -		SEE OPTIO		F			-	D	27.1	0.74	-		SEE OPTI		
I-90 Exit Ramp to SR-254	Diverge	С	24.7	0.61	0.27	В	19.2	0.43	0.28		SEE OF III		F			0.54	D	30.7	0.74	0.58		JEE OF II		
I-90 below SR-254	Basic	В	16.2	0.47	-	В	11.7	0.34	L -				С	C 24.2 0.77 -			С	19.0	0.55	-				
I-90 Entrance Ramp from SR-254	Merge	С	21.1	0.56	0.19	В	15.1	0.40	0.20				D	31.3	0.92	0.34	С	24.8	0.66	0.36				
I-90 b/w SR-254 and SR-57	Basic	С	18.9	0.55	-	В	13.6	0.40	) -				D	32.2	0.91	-	С	22.8	0.65	-				
I-90 Exit Ramp to SR-57	Diverge	С	22.7	0.55	0.23	В	17.7	0.40	0.24				D	34.5	0.91	0.37	С	27.2	0.65	0.39				
I-90 below SR-57	Basic	В	15.2	0.44	-	Α	10.9	0.32	2 -				F	23.3	0.73	-	С	18.1	0.53	-				
I-90 b/w SR-57 and SR-2 Weave	Weave	С	25.6	0.70	-	В	17.7	0.50	) -	В	13.1	0.37 -	F	35.8	1.08	-	D	29.0	0.77	-	С	21.3	0.58 -	
SR-2 West of I-90/SR-2 Diverge	Basic	В	17.5	0.51	-	С	18.8	0.55	; -	В	12.5	0.37 -	С	22.3	0.75	-	D	30.2	0.80	-	С	18.4	0.54 -	
I-90 West of I-90/SR-2 Diverge	Basic	Α	5.6	0.16	-		SEE NO BUILD CONDITION						Α	10.5	0.31	-		SEE NO BUILD CONDITION						

#### CONCLUSIONS

Capacity analyses results in **Table 2 and Table 3** show that the EB I-90 configuration assumed in the TSMO study yields poor levels of service (LOS E) at the I-90 and SR-2 merge section and the downstream 2-lane section prior to the added lane in the critical AM peak period during the design year. Conversely, the alternate EB I-90 configuration yields acceptable levels of service (LOS D or better) in both peak periods. Therefore, the alternate EB I-90 configuration is recommended despite the marginally lower average speed (2 MPH slower than TSMO) and longer travel time (12 seconds longer than TSMO) in the freeway facility.

**Table 2 and Table 3** also show that WB I-90 Option 2 and Option 3 yields acceptable levels of service (LOS D or better) in both peak periods during the design year. While Option 3 technically performs better in terms of speed, density, and travel time, Option 2 is recommended as the preferred alternative for the following reasons:

- Acceptable levels of service can be achieved without constructing three lanes destined for SR-2.
- WB SR-2 in Option 3 would have to taper back to a 2-lane section prior to the Murray Ridge Rd bridge, which means that the resulting LOS C (2045 PM) for WB SR-2 basic freeway segment west of the I-90/SR-2 interchange would only be applicable for at most 1,700 feet before eventually transitioning to the LOS D shown for Option 2.
- In Option 3 traffic from SR-57 that is travelling to I-90 would need to weave an additional lane.

Note the basic freeway segment on WB SR-2 west of the interchange in the 2045 PM No-Build condition yields LOS C, which is better than the LOS D in Option 2 despite both conditions having 2 lanes. This is due to the algorithm in Freeway Facilities module in HCS that takes into account the "metering" effect of traffic due to bottleneck or overcapacity issues at upstream segments (i.e., LOS F at WB I-90 between SR-57 and SR-2 for the No Build condition).

This report finds that the widening of I-90 to be a 6-lane section and implementing Option 2 identified in the TSMO study are recommended to improve traffic operations within the study area. Adding the new EB I-90 lane based on the alternate configuration in lieu of the TSMO study is recommended to achieve acceptable levels of service.

INTERCHANGE OPERATIONS STUDY LOR-90-10.76

**APPENDIX A: CERTIFIED TRAFFIC VOLUMES** 



# **INTER-OFFICE COMMUNICATION**

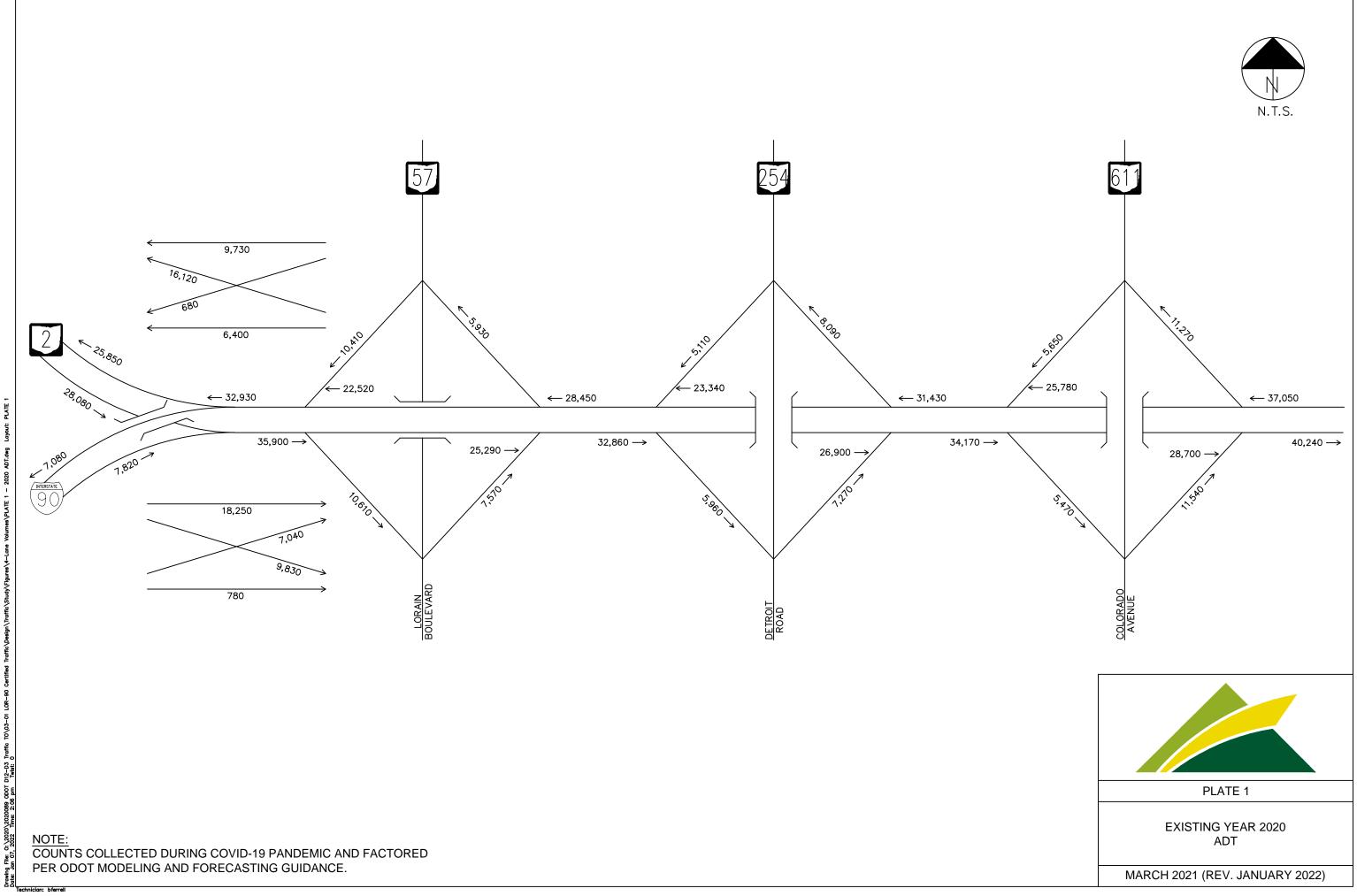
#### TO: Scott Ockunzzi, District 3

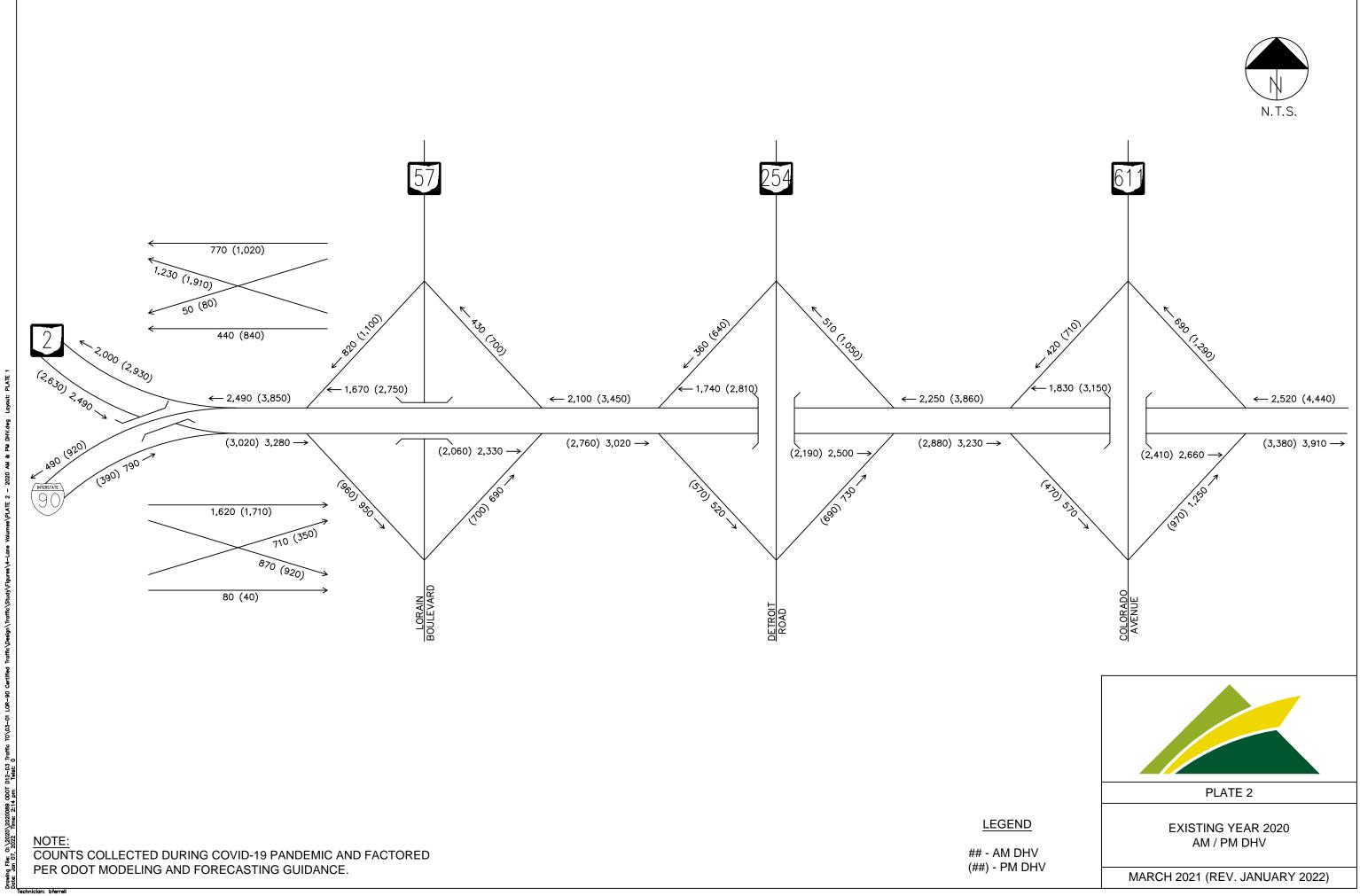
- **FROM:** Bryan Raderstorf, Transportation Engineer, Division of Statewide Planning & Research, Modeling & Forecasting Section
- SUBJECT: LOR-90-10.76, PID 107714
- **DATE:** January 27, 2022

In reply to a request dated January 10, 2022, the plates submitted by GPD Group Inc. have been reviewed and are reasonable for use. Attached are plates showing existing (2020) and opening and design year (2025/2045) volumes for ADT, AM DHV, PM DHV for 4 and 6 lane configurations, as well as existing truck factors. K and D factors can be calculated from plates.

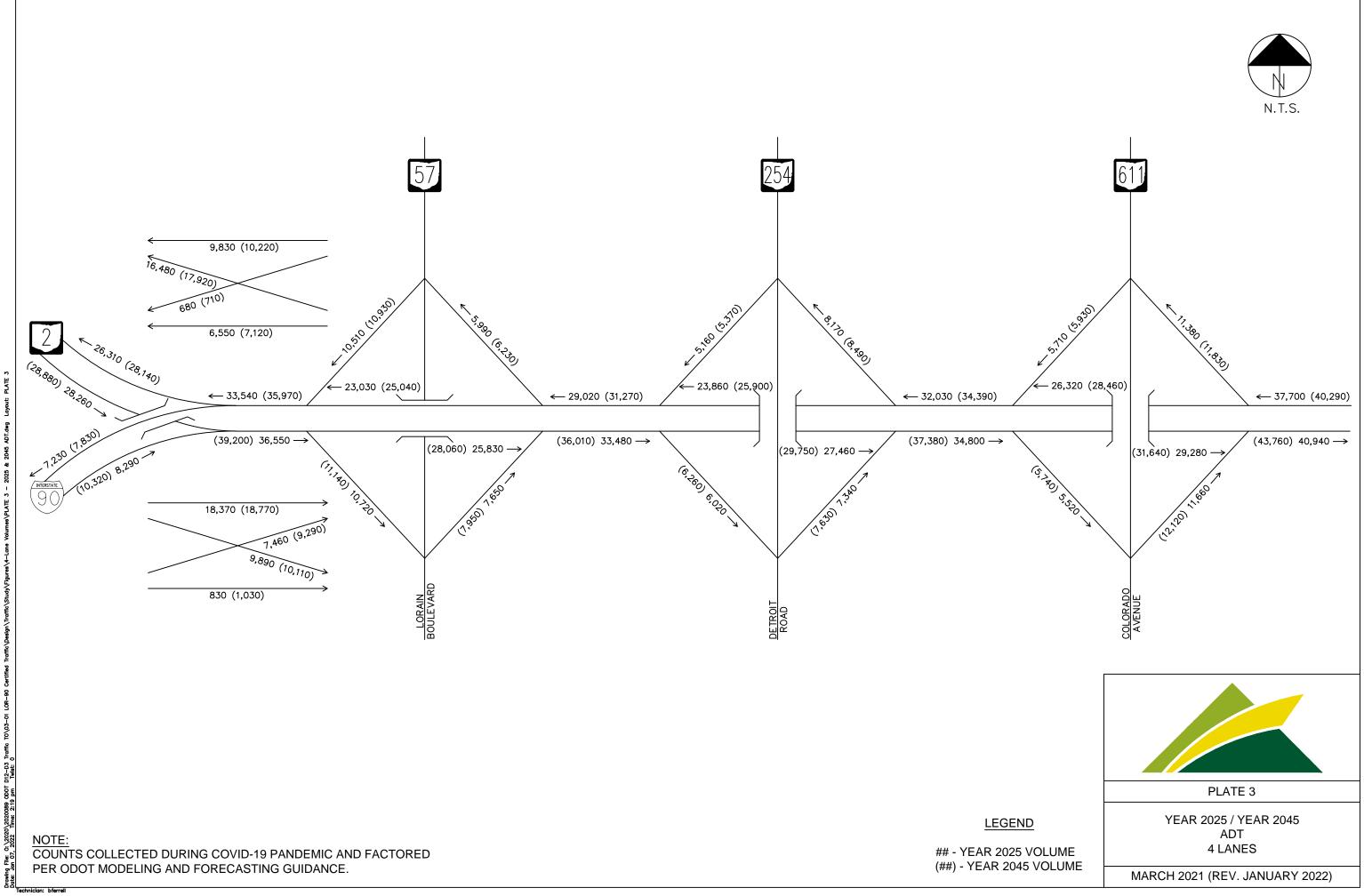
Thanks!

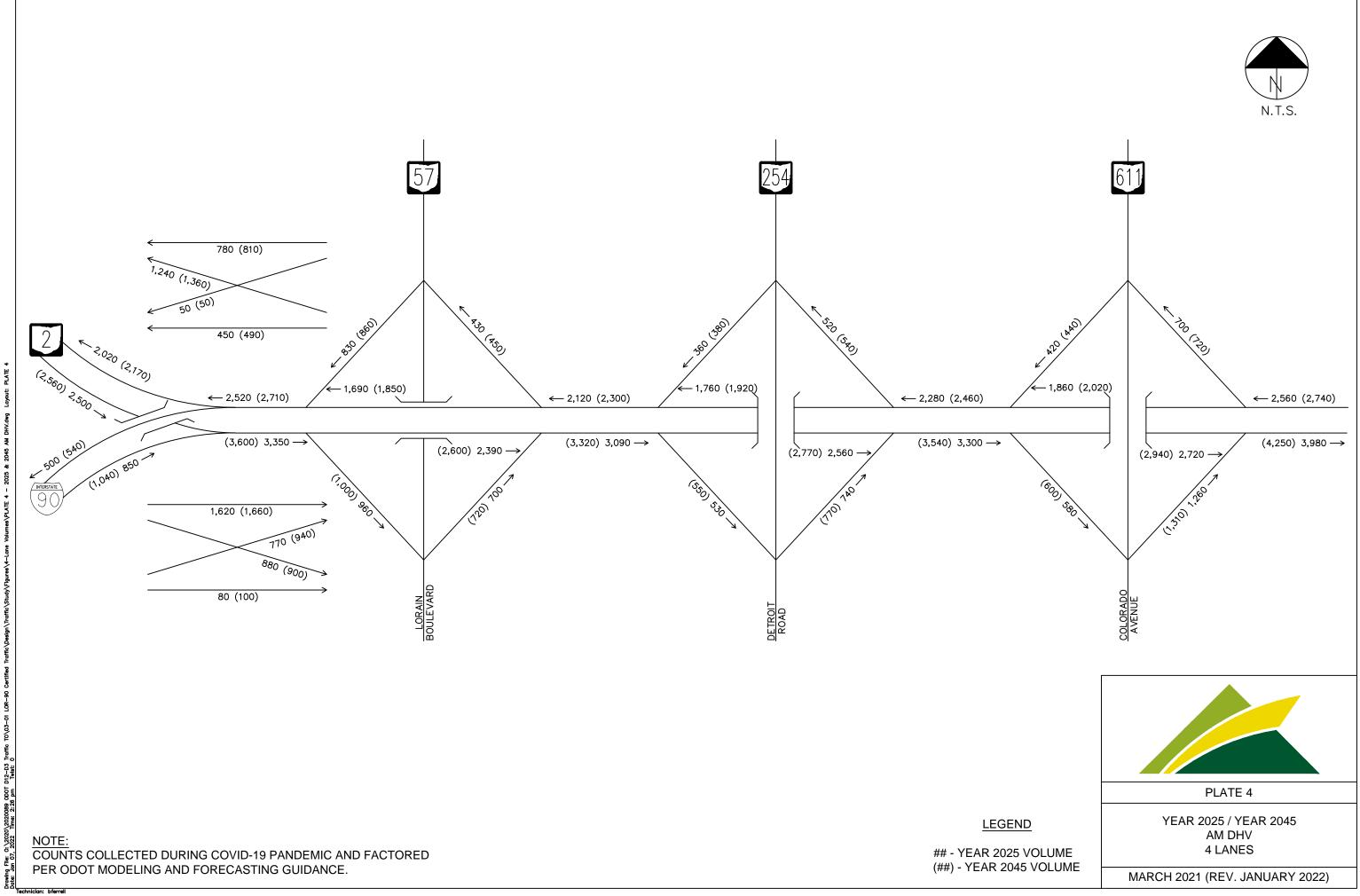
If you have any questions, please contact me at (614) 752-5736.

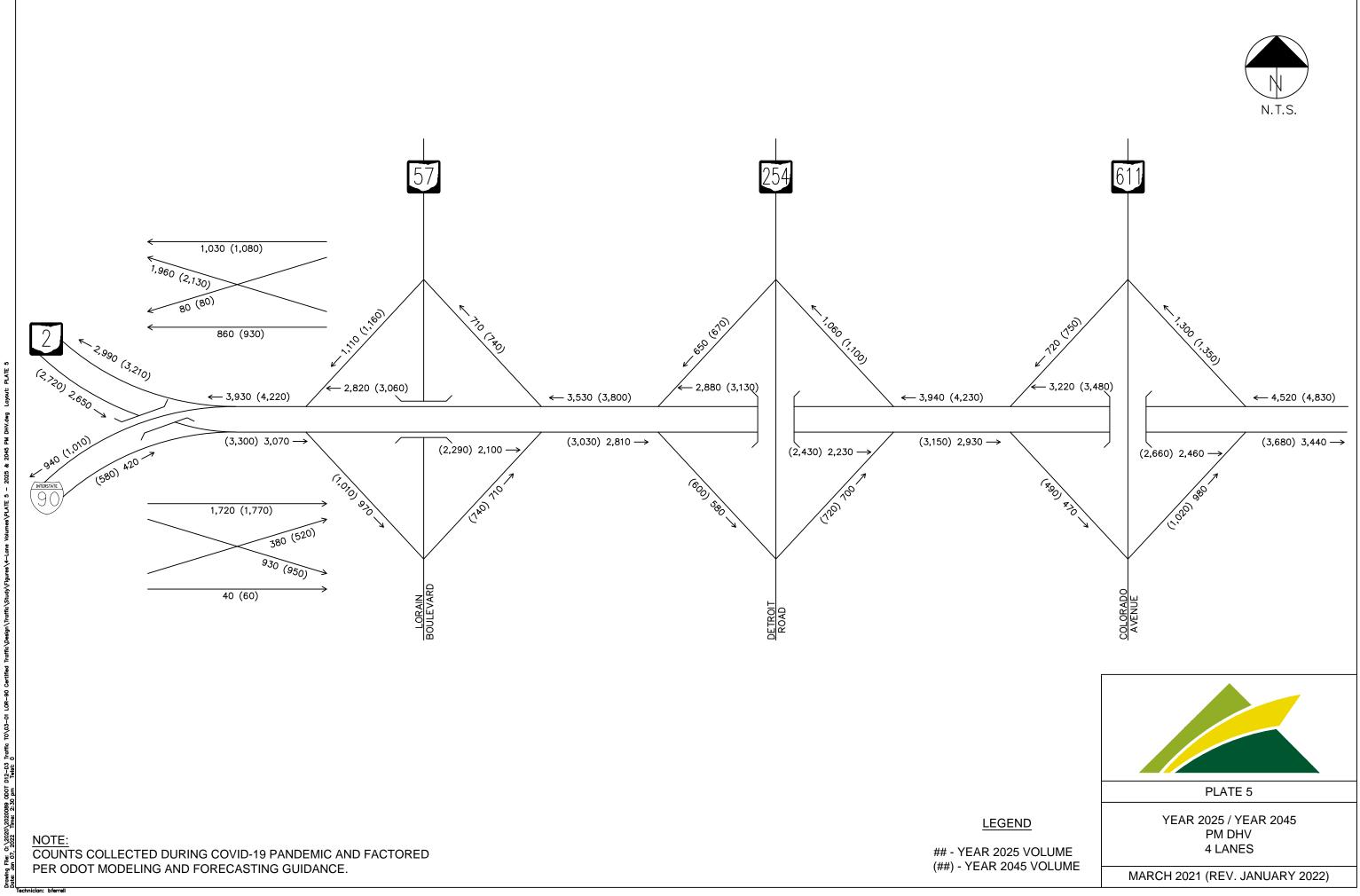




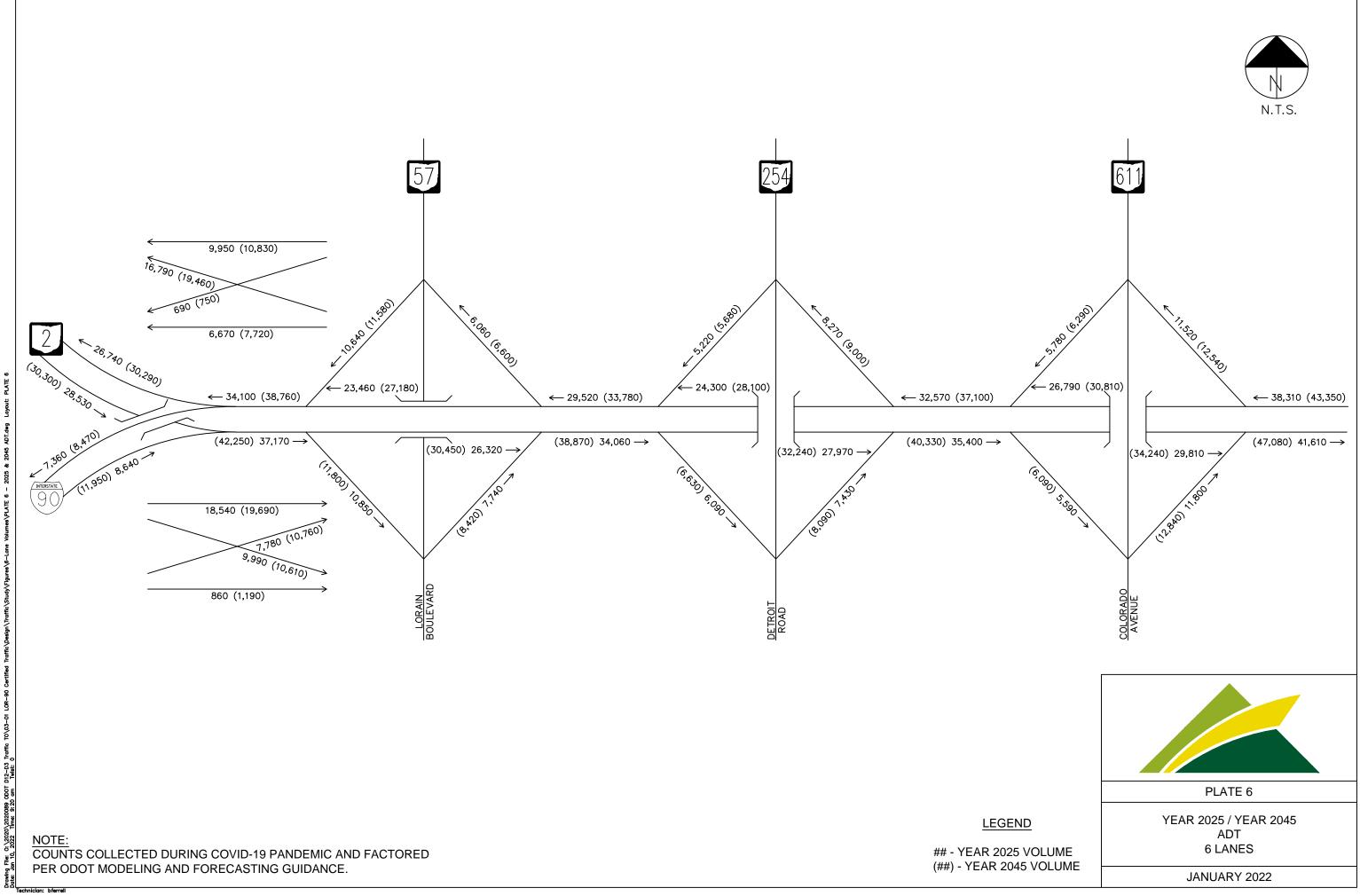
ş Drawing File: 0: \2020\2020089 0D0T D12-D3 Tro Date: Jan 07, 2022 Time: 2:14 pm Twist: 0 F



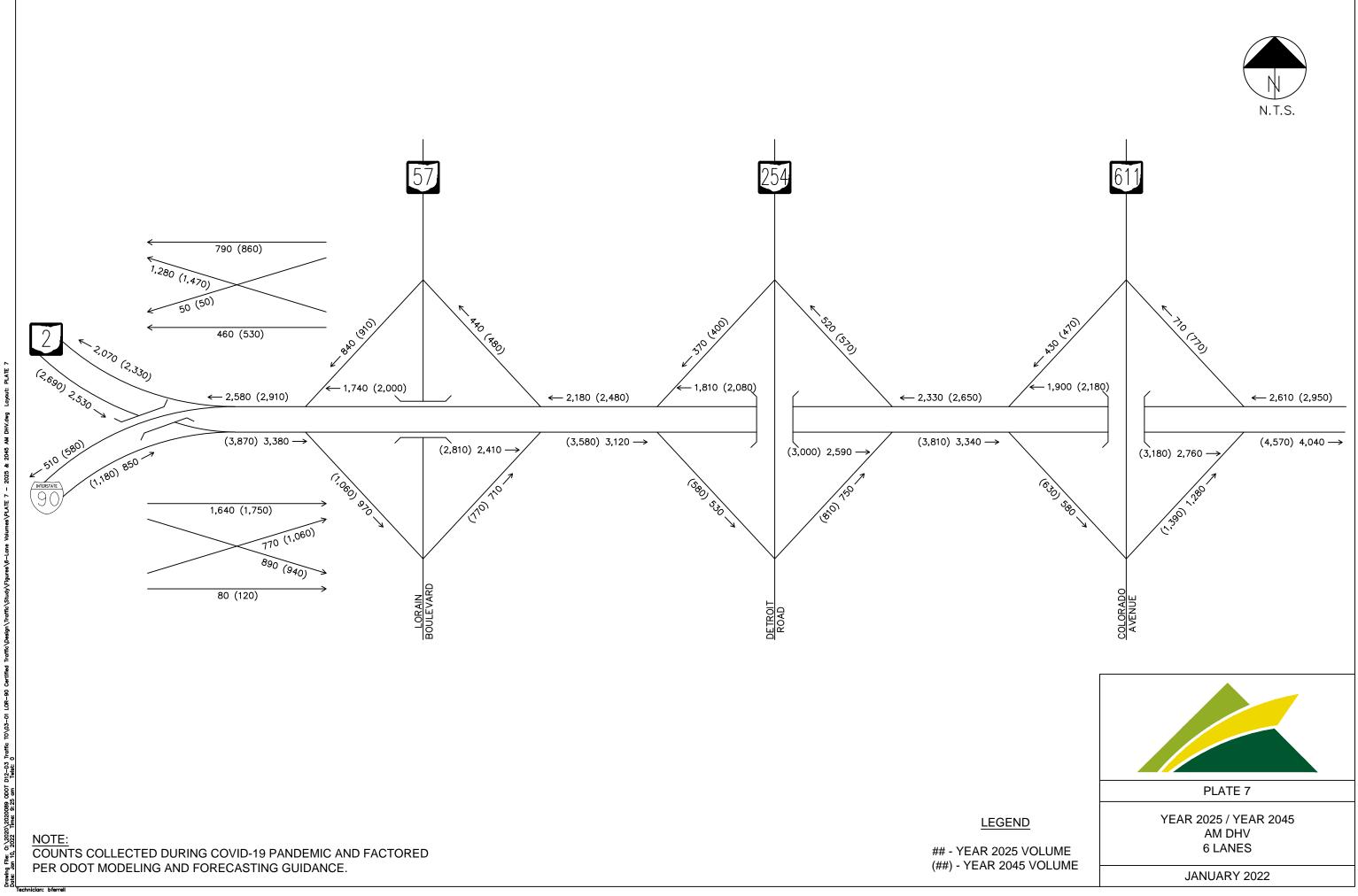


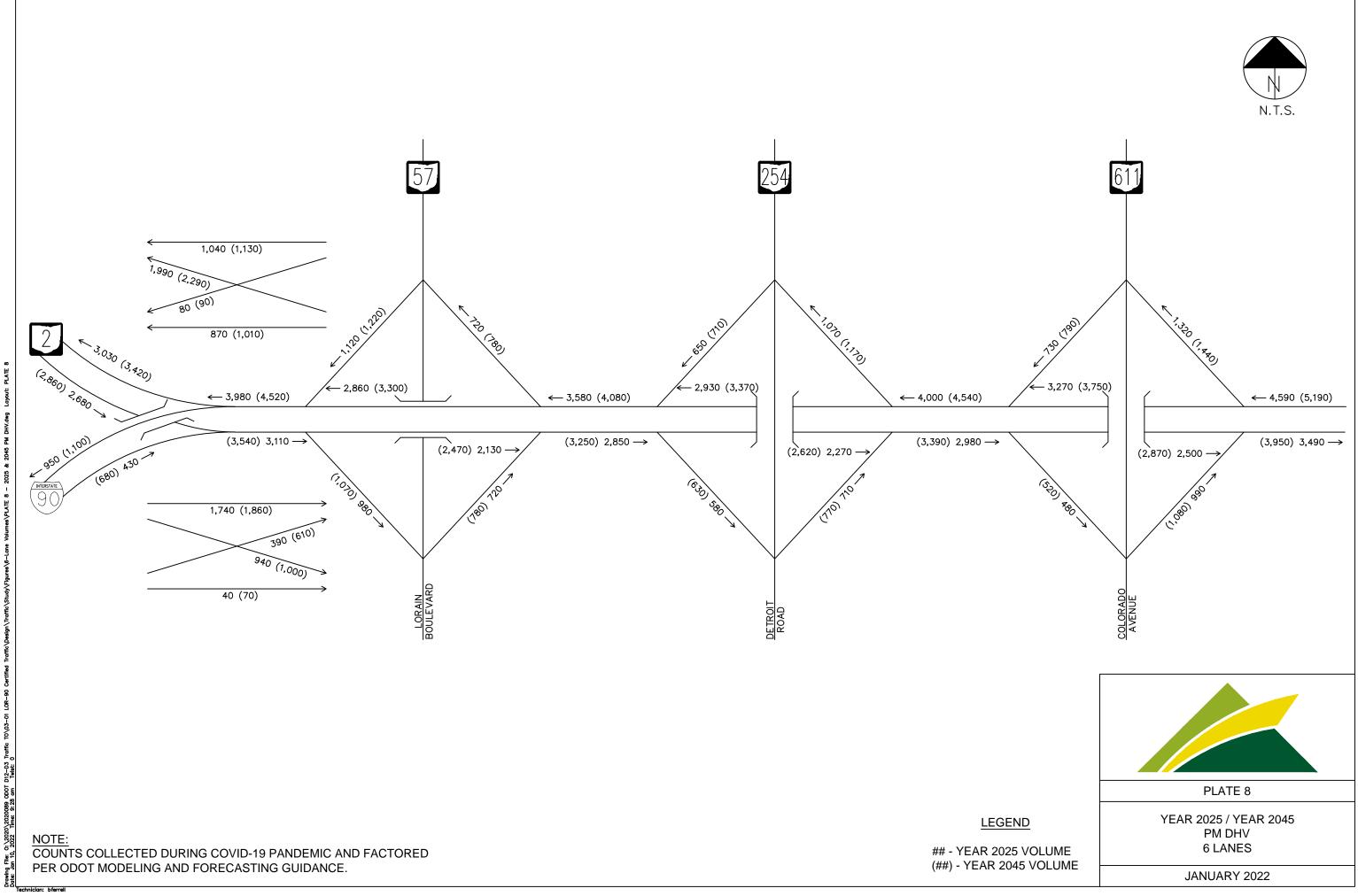


Layout: gwb ¥. D12-D3 Traffic Twist: 0 Drawing File: 0:\2020\2020089 0D0T Date: Jan 07, 2022 Time: 2:30 pm

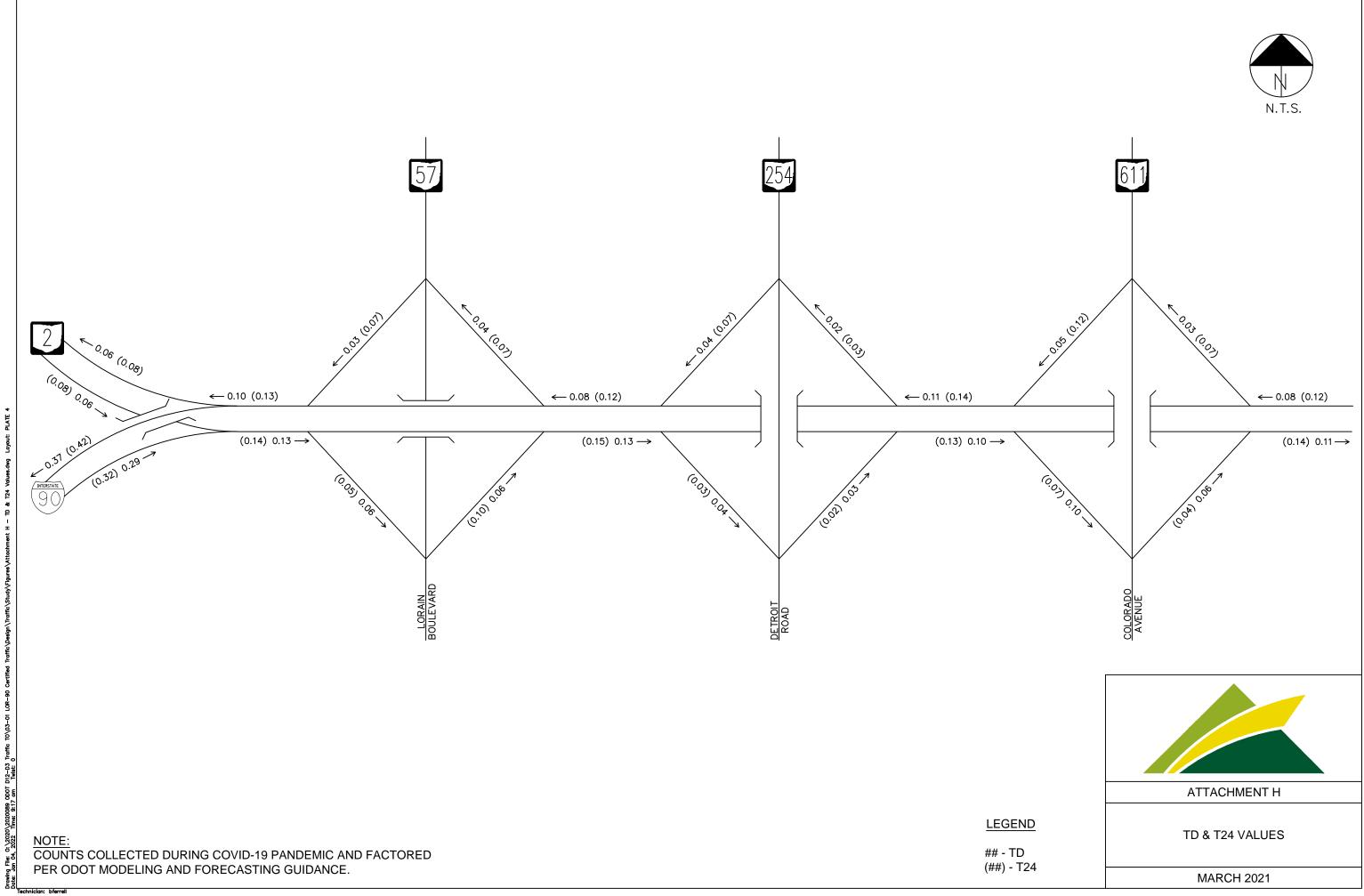


D12-D3 Tr Twist: 0 Drawing File: 0: \2020\2020089 0D0T Date: Jan 10, 2022 Time: 9:20 am





Layout: gwb ¥. D12-D3 Tr Twist: 0 Drawing File: 0: \2020\2020089 0D0T Date: Jan 10, 2022 Time: 9:28 am



INTERCHANGE OPERATIONS STUDY LOR-90-10.76

APPENDIX B: HCS CAPACITY ANALYSIS



## HCS Freeway Facilities Report

## **Project Information**

Analyst	GSH	Date	2/17/23
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Facility Name	I-90 EB NO BUILD	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

### Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	16
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	9.01		

### Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SR-2 West of I-90/SR-2 Merge	5200	2
2	Merge	Merge	I-90 at SR-2 Merge	1500	2
3	Basic	Basic	I-90/SR-2 b/w SR-2 and SR-57	1980	2
4	Diverge	Diverge	I-90 Exit Ramp to SR-57	1500	2
5	Basic	Basic	I-90 below SR-57	3220	2
6	Merge	Merge	I-90 Entrance Ramp from SR-57	1500	2
7	Basic	Basic	I-90 b/w SR-57 and SR-254	7240	2
8	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	2
9	Basic	Basic	I-90 below SR-254	2330	2
10	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	2
11	Basic	Basic	I-90 b/w SR-254 and SR-611	11310	2
12	Diverge	Diverge	I-90 Exit Ramp to SR-611	1500	2
13	Basic	Basic	I-90 below SR-611 (2-lane section)	850	2
14	Basic	Basic	I-90 below SR-611 (3-lane section)	1710	3
15	Merge	Merge	I-90 Entrance Ramp from SR-611	1500	3
16	Basic	Basic	I-90 east of SR-611	3230	3

### Facility Segment Data

	Segment 1: Basic														
АР	PI	łF	fŀ	IV	Flow (pc/		Capa (pc/		d/c Speed Ratio (mi/h)					nsity ni/ln)	LOS
1 0.94 0.943 2888					4800 0.60 69.3					9.3	20	С			
							Segmer	nt 2: Me	rge						
АР	AP PHF		fHV Flow Rat (pc/h)			Capa (pc/			/c tio		eed i/h)	Der (pc/r	LOS		
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	

1	0.94	0.94	0.943	0.775	4316	1428	4800	2200	0.90	0.65	55.4	55.4	39.0	33.4	D						
	0.01	0.01	0.010	0.175	1010	. 120	Segme			0.00	55.1	55.4	55.0	55.1							
AP	Pł	łF	fF	iV	Flow	Rate	Capa			/c	Sp	eed	Der	nsity	LOS						
					(pc,		(pc/			tio		i/h)		ni/ln)							
1	0.9	94	0.8	85	432	27	480	00	0.9	90	59	9.2	30	5.6	E						
					Segment 4: Diverge																
AP	Pł	łF	f⊦	IV	Flow (pc,		Capacity d/o (pc/h) Rati					eed i/h)		nsity ni/ln)	LOS						
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R F		FR		FR		FR		R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.943	4327	1128	4800	2200	0.90	0.51	62.4	62.4	34.7	36.1	E						
							Segme	nt 5: Ba	asic												
AP	Pł	łF	fŀ	iv	Flow (pc,		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS						
1	0.9	94	0.8	85	312	25	480	00	0.	65	68	3.5	22	2.8	C						
							Segmer	nt 6: Me	erge												
АР	Pł	łF	fŀ	iV	Flow (pc,		Capa (pc,			/c tio		eed i/h)		nsity ni/ln)	LOS						
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.							
1	0.94	0.94	0.885	0.943	3937	812	4800	2200	0.82	0.37	57.7	57.7	34.1	31.3	D						
Segment 7: Basic																					
AP	Pł	PHF fHV			Flow (pc,			Capacity (pc/h)				eed i/h)		nsity ni/ln)	LOS						
1	0.9	94	0.8	85	39	91	480	00	0.8	83	62	2.7	3	1.8	D						
							Segmen	t 8: Div	erge												
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS						
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.							
1	0.94	0.94	0.885	0.962	3991	608	4800	2200	0.83	0.28	63.8	63.8	31.3	34.0	D						
							Segme	nt 9: Ba	isic												
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc,			/c tio		eed i/h)		nsity ni/ln)	LOS						
1	0.9	94	0.8	885	333	30	480	00	0.	69	67	7.5	24	1.7	C						
							Segmen	t 10: M	erge												
AP	Pł	łF	f⊦	iv	Flow (pc,		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS						
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.							
1	0.94	0.94	0.885	0.971	4174	844	4800	2200	0.87	0.38	56.4	56.4	37.0	32.7	D						
							Segmer	nt 11: B	asic												
AP	PHF fHV Flow Rate (pc/h)				Capa (pc)			/c tio		eed i/h)		nsity ni/ln)	LOS								
1 0.94 0.909 4143					43	480	00	0.8	86	6	1.2	33	D								
						9	Segment	12: Div	/erge												
АР	AP PHF fHV			IV	Flow (pc,		Capa (pc,			/c tio		eed i/h)	Der (pc/r	LOS							

	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.909	0.909	4143	702	4800	2200	0.86	0.32	63.5	63.5	32.6	35.3	E
							Segmer	nt 13: B	asic					_	-
AP PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS	
1	0.	94	0.9	909	344	41	480	00	0.	72	66	5.9		25.7	С
							Segmer	nt 14: B	asic						
AP PHF		HF	fł	łV	Flow (pc,		Capa (pc,			/c tio	Speed (mi/h)		Density (pc/mi/ln)		LOS
1	0.	94	0.9	909	344	41	72	00	0.4	48	69	9.6		16.4	В
							Segmen	t 15: M	erge						
AP	P	HF	fŀ	IV	Flow (pc,		Capa (pc,			/c tio	Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.909	0.943	4919	1478	7200	2200	0.68	0.67	61.8	60.1	26.5	26.7	С
							Segmen	nt 16: B	asic		<u>.</u>				
AP	P	HF	fł	łV	Flow (pc,		Capa (pc,			/c tio	Speed (mi/h)		Density (pc/mi/ln)		LOS
1	0.	94	0.9	901	50	18	72	00	0.70		67.4		24.8		С
Fac	ility A	nalysi	is Res	ults											
АР	VMT         VMT-Demand         VHD         Total Delay Cost         Speed         Density           veh-mi/AP         veh-h/AP         \$/AP         mi/h         pc/mi/ln						nsity mi/ln	TT min	LOS						
1	1 7981 7225			12	2.54	313.43		63.1		29.2 26		6.3	8.60	D	
Fac	ility O	veral	l Resu	lts											
Spac	Space Mean Speed, mi/h 63.1 Average Density, veh/mi/In					26	.3								
Average Travel Time, min 8.60						Averag	e Densi <sup>.</sup>	ty, pc/r	ni/ln	29	29.2				
Total	VMT, ve	h-mi			7981			Total V	Total VHD, veh-h				54		
Vehio	le Value	of Time	e (VOT),	\$/h	25.00			Total D	elay Co	st, \$		31	3.43		
Copyrio	ht © 202	3 Univers	sity of Flo	rida. All R	ights Reserve	d.	HCS TM Freev	ways Versior	2023			-	Generat	ed: 08/23/202	3 13:31:0

Copyright © 2023 University of Florida. All Rights Reserved.

HCSTM Freeways Version 2023 I-90 EB 2045 AM - NO BUILD.xuf Generated: 08/23/2023 13:31:00

						LOS						
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	С	D	Е	E	С	D	D	D	С	D	D	E
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	С	В	С	С								
					Sp	peed (mi/	′h)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	69.3	55.4	59.2	62.4	68.5	57.7	62.7	63.8	67.5	56.4	61.2	63.5
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	66.9	69.6	61.8	67.4								
					Dens	sity (pc/n	ni/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	20.8	39.0	36.6	34.7	22.8	34.1	31.8	31.3	24.7	37.0	33.9	32.6
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	25.7	16.4	26.5	24.8								
				D	emand -	Capacity	Ratio (D/	<b>′C)</b>				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.60	0.90	0.90	0.90	0.65	0.82	0.83	0.83	0.69	0.87	0.86	0.86
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	0.72	0.48	0.68	0.70								
					Dens	ity (veh/ı	ni/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	19.6	36.8	32.4	30.7	20.2	30.2	28.1	27.7	21.9	32.7	30.8	29.6
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	23.4	14.9	24.1	22.3								
				Density	in Ramp	Influenc	e Area (p	c/mi/ln)				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	-	33.4	-	36.1	-	31.3	-	34.0	-	32.7	-	35.3
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	-	-	26.7	-								
						sity-Base	LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	С	D	E	E	С	D	D	D	C	D	D	E
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	С	В	С	С								
					Dema	and-Base	d LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	-	-	-	-	-	-	-	-	-	-	-	-
	Seg 13	Seg 14	Seg 15	Seg 16								

AP 1	-	-	-	-								
				v	olume - (	Capacity	Ratio (V/	C)				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.60	0.90	0.90	0.90	0.65	0.82	0.83	0.83	0.69	0.87	0.86	0.86
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	0.72	0.48	0.68	0.70								

# HCS Basic Freeway Report

### **Project Information**

Project Information			
Analyst	GSH	Date	2/17/23
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	SR-2 West of I-90/SR-2 Merge
Analysis Period Number	1	Segment Analysis Period	08:00-08:15
Geometric Data			
Number of Lanes (N), In	2	Terrain Type	Level
Segment Length (L), ft	5200	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000
Demand and Capacity			
Demand Volume (V), veh/h	2560	Heavy Vehicle Adjustment Factor (fHV)	0.943
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1444
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.60
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.3
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

# HCS Freeway Merge Report

### **Project Information**

Project Information						
Segment Number	egment Number 2		Segment Name	I-90 at SR-	2 Merge	
Analysis Period Number	1		Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway			
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceler	ration Length (LA)	, ft	1500	830		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic	Stream		0	-		
Final Speed Adjustment Factor	or (SAF)		1.000	1.000		
Demand Adjustment Factor (	DAF)		1.000	1.000		
Capacity Adjustment Factor f	or CAVs, CAFCAV		1.000	-		
Final Capacity Adjustment Fa	ctor (CAF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2560	1040		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			6.00	29.00		
Heavy Vehicle Adjustment Fa	ctor (fHV)		0.943	0.775		
Flow Rate (vi), pc/h			2888	1428		
Capacity (cmd), pc/h			4800	2200		
Adjusted Capacity (cmda), pc,	/h		4800	2200		
Volume-to-Capacity Ratio (v/	/c)		0.90	0.65		
Speed and Density						
Upstream Equilibrium Distan	ce (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/h	n	-	
Downstream Equilibrium Dist	tance (LEQ), ft	-	On-Ramp Influence Area Spee	d (SR), mi/h	55.4	
Flow in Lanes 1 and 2 (v12), p	oc/h	2888	Outer Lanes Freeway Speed (S	0), mi/h	70.0	
Flow Entering Ramp-Infl. Are	a (vR12), pc/h	4316	Ramp Junction Speed (S), mi/h	55.4		
Number of Outer Lanes on F	reeway (NO), In	0	Average Density (D), pc/mi/ln 39.0			
Level of Service (LOS)		D	Density in Ramp Influence Area (DR), pc/mi/ln 33.4			

HCS Basic Freeway Report								
Project Information								
Segment Number	3	Segment Name	I-90/SR-2 b/w SR-2 and SR-57					
Analysis Period Number	1	Segment Analysis Period	08:00-08:15					
Geometric Data								
Number of Lanes (N), In	2	Terrain Type	Level					
Segment Length (L), ft	1980	Percent Grade, %	-					
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-					
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00					
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0					
Right-Side Lateral Clearance, ft	-							
Adjustment Factors								
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000					
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000					
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000					
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000					
Demand and Capacity								
Demand Volume (V), veh/h	3600	Heavy Vehicle Adjustment Factor (fHV)	0.885					
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	2164					
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400					
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (Cadj), pc/h/ln	2400					
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400					
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.90					
Speed and Density								
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	59.2					
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	36.6					
Total Ramp Density Adjustment	-	Level of Service (LOS)	E					
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0							

Project information						
Segment Number 4			Segment Name	I-90 Exit R	amp to SR-57	
Analysis Period Number 1			Segment Analysis Period	08:00-08:1	5	
Geometric Data			•			
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD), ft	:	1500	600		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			-			
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs,	CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	F)		1.000	1.000		
Demand and Capacity			^			
Demand Volume (Vi), veh/h			3600	1000		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			13.00	6.00	6.00	
Heavy Vehicle Adjustment Factor (fHV	/)		0.885	0.943	0.943	
Flow Rate (vi), pc/h			4327	1128		
Capacity (cmd), pc/h			4800	2200		
Initial Adjusted Capacity (cmda), pc/h			4800	-		
Final Adjusted Capacity (cmda), pc/h			4800	2200		
Volume-to-Capacity Ratio (v/c)			0.90	0.51	0.51	
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft -		Flow Outer Lanes (vOA), pc/h/In	1	-	
Downstream Equilibrium Distance (LE	:Q), ft -		Off-Ramp Influence Area Speed	d (SR), mi/h	62.4	
Flow in Lanes 1 and 2 (v12), pc/h	4	327	Outer Lanes Freeway Speed (Sc	), mi/h	76.8	
Flow Entering Ramp-Infl. Area (vR12),	pc/h -		Ramp Junction Speed (S), mi/h		62.4	
Number of Outer Lanes on Freeway (	No), In 0	)	Average Density (D), pc/mi/ln		34.7	
Level of Service (LOS)	E		Density in Ramp Influence Area	a (DR), pc/mi/ln	36.1	

	HCS Basic Freeway Report				
Project Information					
Segment Number	5	Segment Name	I-90 below SR-57		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	3220	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.17		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors		•	•		
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000		
Demand and Capacity		- -			
Demand Volume (V), veh/h	2600	Heavy Vehicle Adjustment Factor (fHV)	0.885		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1562		
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.65		
Speed and Density	·	• •	·		
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.5		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.8		
Total Ramp Density Adjustment	-	Level of Service (LOS)	с		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

roject mornation						
Segment Number 6	5		Segment Name	I-90 Entra	nce Ramp from SR-57	
Analysis Period Number 1	1		Segment Analysis Period	08:00-08:1	15	
Geometric Data			•			
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Le	ength (LA), ft		1500	730		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	ed One-Lane	
Adjustment Factors			•	•		
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Seve	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Capacity Adjustment Factor for CAVs,	, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	νF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2600	720		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			13.00	6.00	6.00	
Heavy Vehicle Adjustment Factor (fh\	v)		0.885	0.943	0.943	
Flow Rate (vi), pc/h			3125	812	812	
Capacity (cmd), pc/h			4800	2200	2200	
Adjusted Capacity (cmda), pc/h			4800	2200	2200	
Volume-to-Capacity Ratio (v/c)			0.82	0.37	0.37	
Speed and Density						
Upstream Equilibrium Distance (LEQ),	, ft -		Flow Outer Lanes (vOA), pc/h/	íln	-	
Downstream Equilibrium Distance (Le	EQ), ft -		On-Ramp Influence Area Spee	n-Ramp Influence Area Speed (SR), mi/h 57.7		
Flow in Lanes 1 and 2 (v12), pc/h	3	3125	Outer Lanes Freeway Speed (S	So), mi/h	70.0	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 3	3937	Ramp Junction Speed (S), mi/	ĥ	57.7	
Number of Outer Lanes on Freeway (	(No), In 0	)	Average Density (D), pc/mi/ln		34.1	
Level of Service (LOS)	C	)	Density in Ramp Influence Are	ea (DR), pc/mi/ln	31.3	

HCS Basic Freeway Report					
Project Information					
Segment Number	7	Segment Name	I-90 b/w SR-57 and SR-254		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	7240	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	3320	Heavy Vehicle Adjustment Factor (fHV)	0.885		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1996		
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.83		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	62.7		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	31.8		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information						
Segment Number	8		Segment Name	I-90 Exit R	amp to SR-254	
Analysis Period Number	1		Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration L	ength (LD).	, ft	1500	510		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			•			
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)	)		1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs	s, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	AF)		1.000	1.000	1.000	
Demand and Capacity			•	•		
Demand Volume (Vi), veh/h			3320	550		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			13.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (fH	IV)		0.885	0.962	0.962	
Flow Rate (vi), pc/h			3991	608	608	
Capacity (cmd), pc/h			4800	2200	2200	
Initial Adjusted Capacity (cmda), pc/h	า		4800	-		
Final Adjusted Capacity (cmda), pc/h			4800	2200		
Volume-to-Capacity Ratio (v/c)			0.83	0.28	0.28	
Speed and Density						
Upstream Equilibrium Distance (LEQ)	), ft	-	Flow Outer Lanes (vOA), pc/h/ln		-	
Downstream Equilibrium Distance (L	.EQ), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	63.8	
		i		· · //	76.8	
Flow in Lanes 1 and 2 (v12), pc/h		3991	Outer Lanes Freeway Speed (So	), mi/h	70.0	
Flow in Lanes 1 and 2 (v12), pc/h Flow Entering Ramp-Infl. Area (vR12)	, pc/h	3991 -	Outer Lanes Freeway Speed (So Ramp Junction Speed (S), mi/h	ı), mı/n	63.8	
•	-	3991 - 0		), mi/n		

HCS Basic Freeway Report					
Project Information					
Segment Number	9	Segment Name	I-90 below SR-254		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	2330	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors		•	•		
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000		
Demand and Capacity	<u>.</u>	- -			
Demand Volume (V), veh/h	2770	Heavy Vehicle Adjustment Factor (fHV)	0.885		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1665		
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.69		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	67.5		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	24.7		
Total Ramp Density Adjustment	-	Level of Service (LOS)	с		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

rioject mormation						
Segment Number	10		Segment Name	I-90 Entra	ince Ramp from SR-254	
Analysis Period Number	1		Segment Analysis Period	08:00-08:	15	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration L	ength (LA),	ft	1500	800		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	ed One-Lane	
Adjustment Factors				•		
Driver Population			All Familiar	All Familia	ar	
Weather Type			Non-Severe Weather	Non-Seve	ere Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream	l		0	-	-	
Final Speed Adjustment Factor (SAF	)		1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Capacity Adjustment Factor for CAV	s, CAFcav		1.000	-		
Final Capacity Adjustment Factor (C	AF)		1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi), veh/h			2770	770		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			13.00	3.00	3.00	
Heavy Vehicle Adjustment Factor (f⊦	<b>∀</b> V)		0.885	0.971	0.971	
Flow Rate (vi), pc/h			3330	844	844	
Capacity (cmd), pc/h			4800	2200	2200	
Adjusted Capacity (cmda), pc/h			4800	2200	2200	
Volume-to-Capacity Ratio (v/c)			0.87	0.38	0.38	
Speed and Density						
Upstream Equilibrium Distance (LEQ	), ft	-	Flow Outer Lanes (vOA), pc/h/	In	-	
Downstream Equilibrium Distance (l	LEQ), ft	-	On-Ramp Influence Area Spee	ed (SR), mi/h	56.4	
Flow in Lanes 1 and 2 (v12), pc/h		3330	Outer Lanes Freeway Speed (S	50), mi/h	70.0	
Flow Entering Ramp-Infl. Area (vR12)	), pc/h	4174	Ramp Junction Speed (S), mi/	h	56.4	
Number of Outer Lanes on Freeway	(No), In	0	Average Density (D), pc/mi/ln		37.0	
Level of Service (LOS)		D	Density in Ramp Influence Are	ea (DR), pc/mi/ln	32.7	

HCS Basic Freeway Report					
Project Information					
Segment Number	11	Segment Name	I-90 b/w SR-254 and SR-611		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	11310	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	3540	Heavy Vehicle Adjustment Factor (fHV)	0.909		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	2072		
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.86		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.2		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	33.9		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information						
Segment Number	12		Segment Name	I-90 Exit R	amp to SR-611	
Analysis Period Number	1		Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD),	ft	1500	510		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			-			
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs	, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			3540	600		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			10.00	10.00	10.00	
Heavy Vehicle Adjustment Factor (fh	V)		0.909	0.909	0.909	
Flow Rate (vi), pc/h			4143	702	702	
Capacity (cmd), pc/h			4800	2200	2200	
Initial Adjusted Capacity (cmda), pc/h	l		4800	-	-	
Final Adjusted Capacity (cmda), pc/h			4800	2200		
Volume-to-Capacity Ratio (v/c)			0.86	0.32	0.32	
Speed and Density						
Upstream Equilibrium Distance (LEQ)	, ft	-	Flow Outer Lanes (vOA), pc/h/lr	n	-	
Downstream Equilibrium Distance (L	EQ), ft	-	Off-Ramp Influence Area Speed	d (SR), mi/h	63.5	
Flow in Lanes 1 and 2 (v12), pc/h		4143	Outer Lanes Freeway Speed (So	o), mi/h	76.8	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h		63.5	
Number of Outer Lanes on Freeway	(No), In	0	Average Density (D), pc/mi/ln		32.6	
Level of Service (LOS)		E	Density in Ramp Influence Area	(D-) ( '/	35.3	

HCS Basic Freeway Report					
Project Information					
Segment Number	13	Segment Name	I-90 below SR-611 (2-lane section)		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	850	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	2940	Heavy Vehicle Adjustment Factor (fHV)	0.909		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1720		
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.72		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	66.9		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	25.7		
Total Ramp Density Adjustment	-	Level of Service (LOS)	с		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

HCS Basic Freeway Report					
Project Information					
Segment Number	14	Segment Name	I-90 below SR-611 (3-lane section)		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	1710	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.67		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	2940	Heavy Vehicle Adjustment Factor (fHV)	0.909		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1147		
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.48		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.6		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.4		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

rojectimormation						
Segment Number	15		Segment Name	I-90 Entrai	nce Ramp from SR-611	
Analysis Period Number	1		Segment Analysis Period	08:00-08:1	5	
Geometric Data			-			
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration L	ength (LA).	, ft	1500	940		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors				•		
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream	l		0	-	-	
Final Speed Adjustment Factor (SAF	)		1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAV	s, CAFcav		1.000	-		
Final Capacity Adjustment Factor (C	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2940	1310		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			10.00	6.00	6.00	
Heavy Vehicle Adjustment Factor (fr	HV)		0.909	0.943	0.943	
Flow Rate (vi), pc/h			3441	1478	1478	
Capacity (cmd), pc/h			7200	2200	2200	
Adjusted Capacity (cmda), pc/h			7200	2200	2200	
Volume-to-Capacity Ratio (v/c)			0.68	0.67	0.67	
Speed and Density						
Upstream Equilibrium Distance (LEQ	), ft	1944.6	Flow Outer Lanes (vOA), pc/h/lr	1	1363	
Downstream Equilibrium Distance (	LEQ), ft	-	On-Ramp Influence Area Speed	d (SR), mi/h	60.1	
Flow in Lanes 1 and 2 (v12), pc/h		2078	Outer Lanes Freeway Speed (So	D), mi/h	66.9	
Flow Entering Ramp-Infl. Area (vR12	), pc/h	3556	Ramp Junction Speed (S), mi/h		61.8	
Number of Outer Lanes on Freeway	(No), In	1	Average Density (D), pc/mi/ln		26.5	
Level of Service (LOS)		С	Density in Ramp Influence Area	a (DR), pc/mi/ln	26.7	

	HCS Basic F	reeway Report		
Project Information				
Segment Number	16	Segment Name	I-90 east of SR-611	
Analysis Period Number	1	Segment Analysis Period	08:00-08:15	
Geometric Data				
Number of Lanes (N), In	3	Terrain Type	Level	
Segment Length (L), ft	3230	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors		·		
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	4250	Heavy Vehicle Adjustment Factor (fHV)	0.901	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1673	
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.70	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	67.4	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	24.8	
Total Ramp Density Adjustment	-	Level of Service (LOS)	С	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

Copyright © 2023 University of Florida. All Rights Reserved.

HCS T Freeways Version 2023 I-90 EB 2045 AM - NO BUILD.xuf Generated: 08/23/2023 13:31:31

## HCS Basic Freeway Report

#### **Project Information**

Project Information				
Analyst	GSH	Date	2/17/2023	
Agency	CMT	Analysis Year	2045	
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV	
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary	
Geometric Data				
Number of Lanes (N), In	2	Terrain Type	Level	
Segment Length (L), ft	-	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	2080	Heavy Vehicle Adjustment Factor (fHV)	0.775	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1428	
Total Trucks, %	29.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.59	
Speed and Density		•		
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.4	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.6	
Total Ramp Density Adjustment	-	Level of Service (LOS)	С	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			
Copyright © 2023 University of Florida. All Rights	Reserved. HCSTM Freewa	ays Version 2023	Generated: 08/23/2023 13:34:	

Copyright © 2023 University of Florida. All Rights Reserved.

HCS TM Freeways Version 2023 I-90 EB W of SR2 Basic 2045 AM - NO BUILD.xuf Generated: 08/23/2023 13:34:28

## HCS Freeway Facilities Report

### **Project Information**

Analyst	GSH	Date	2/17/23
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Facility Name	I-90 EB NO BUILD	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

### Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	16
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	9.01		

### Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SR-2 West of I-90/SR-2 Merge	5200	2
2	Merge	Merge	I-90 at SR-2 Merge	1500	2
3	Basic	Basic	I-90/SR-2 b/w SR-2 and SR-57	1980	2
4	Diverge	Diverge	I-90 Exit Ramp to SR-57	1500	2
5	Basic	Basic	I-90 below SR-57	3220	2
6	Merge	Merge	I-90 Entrance Ramp from SR-57	1500	2
7	Basic	Basic	I-90 b/w SR-57 and SR-254	7240	2
8	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	2
9	Basic	Basic	I-90 below SR-254	2330	2
10	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	2
11	Basic	Basic	I-90 b/w SR-254 and SR-611	11310	2
12	Diverge	Diverge	I-90 Exit Ramp to SR-611	1500	2
13	Basic	Basic	I-90 below SR-611 (2-lane section)	850	2
14	Basic	Basic	I-90 below SR-611 (3-lane section)	1710	3
15	Merge	Merge	I-90 Entrance Ramp from SR-611	1500	3
16	Basic Basic		I-90 east of SR-611	3230	3

### Facility Segment Data

	Segment 1: Basic														
АР	PI	HF	fŀ	IV	Flow (pc,		Capa (pc,		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.	94	0.9	943	300	69	480	00	0.	64	6	8.7	22	2.3	С
							Segmer	nt 2: Me	rge						
АР	AP     PHF     fHV     Flow Rate (pc/h)     Capacity (pc/h)     d/c     Speed (mi/h)     Density (pc/mi/ln)     LOS														
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	

1	0.94	0.94	0.943	0.775	3865	796	4800	2200	0.81	0.36	58.4	58.4	33.1	30.1	D
	0.01	0.01	0.0 10	0.175			Segme			0.00	50.1	50.4	55.1	50.1	
AP	Pł	4F	fF	١V	Flow	Rate	Capa			/c	Sp	eed	Der	nsity	LOS
		-		-	(pc,		(pc/			tio		i/h)		ni/ln)	
1	0.9	94	0.8	885	39	67	480	00	0.8	83	62	2.9	3	1.5	D
							Segmen	t 4: Div	erge						
ΑΡ	Pł	łF	fŀ	iV	Flow (pc,		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.943	3967	1139	4800	2200	0.83	0.52	62.4	62.4	31.8	33.0	D
Segment 5: Basic															
AP	AP PHF fHV		iV	Flow (pc,		Capa (pc,			/c tio		eed i/h)		nsity ni/ln)	LOS	
1	0.9	94	0.8	85	27	53	480	00	0.	57	69	9.6	19	9.8	С
Segment 6: Merge															
АР	Pł	PHF fHV Flow Rate (pc/h)			Capa (pc,			/c tio		eed i/h)		nsity ni/ln)	LOS		
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.943	3588	835	4800	2200	0.75	0.38	59.3	59.3	30.3	28.6	D
Segment 7: Basic															
AP	Pł	IF fHV		IV	Flow Rate (pc/h)		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.8	85	364	42	480	00	0.	76	65	5.5	27	7.8	D
							Segmen	t 8: Div	erge						
AP	Pł	łF	fŀ	IV	Flow (pc,		Capacity (pc/h)			/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.962	3642	664	4800	2200	0.76	0.30	63.6	63.6	28.6	31.0	D
							Segme	nt 9: Ba	asic						
AP	Pł	łF	f⊦	IV	Flow (pc,		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.8	85	292	21	480	00	0.	61	69	9.2	2	1.1	С
							Segmen	t 10: M	erge						
AP	Pł	łF	fŀ	iV	Flow (pc,		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.971	3710	789	4800	2200	0.77	0.36	59.0	59.0	31.4	29.1	D
Segment 11: Basic															
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	909	36	87	480	00	0.	77	65	5.2	28	3.3	D
						9	Segment	12: Div	/erge						
AP	AP PHF fHV		IV	Flow (pc,		Capa (pc/		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS	

	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.909	0.909	3687	573	4800	2200	0.77	0.26	63.8	63.8	28.9	31.4	D
							Segmer	nt 13: B	asic			1			
АР	PI	HF	fŀ	IV	Flow (pc,			Capacity (pc/h)		/c tio	Speed (mi/h)		Density (pc/mi/ln)		LOS
1	0.	94	0.9	909	3113		480	00	0.	65	68	3.5		22.7	С
							Segmer	nt 14: B	asic						
AP	PI	HF	fŀ	IV	Flow (pc,		Capa (pc,			/c tio		eed i/h)		ensity :/mi/ln)	LOS
1	0.	94	0.9	909	31	13	72	00	0.	43	69	9.8		14.8	В
							Segmen	t 15: M	erge						
ΑΡ	PI	HF	fŀ	IV	Flow (pc,		Capa (pc,			/c tio		eed i/h)		ensity :/mi/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.909	0.943	4264	1151	7200	2200	0.59	0.52	63.2	61.7	22.5	22.8	С
							Segmer	nt 16: B	asic						
ΑΡ	PI	HF	fŀ	IV	Flow (pc,		Capa (pc,			/c tio	Speed (mi/h)			ensity :/mi/ln)	LOS
1	0.	94	0.9	901	434	45	72	00	0.	60	69	9.3	20.9		С
Faci	lity A	nalysi	is Res	ults											
AP	VM veh-mi			Deman -mi/AP		HD -h/AP	Total Delay \$/AP	Cost	Speed mi/h	Τ	Density pc/mi/ln		nsity /mi/ln	TT min	LOS
1	724	8	e	598	7	.36	183.92		65.4		25.6	2	3.1	8.30	С
Faci	lity O	veral	Resu	lts											
Space	e Mean S	Speed,	mi/h		65.4			Averag	e Densi	ty, veh/	′mi/ln	23.	.1		
Avera	ige Trave	el Time,	min		8.30			Averag	e Densi	ty, pc/r	ni/ln	25.	6		
Total	VMT, ve	h-mi			7248			Total VHD, veh-h				7.3	7.36		
Vehic	le Value	of Time	e (VOT),	\$/h	25.00			Total D	elay Co	st, \$		18	3.92		
Copyright © 2023 University of Florida. All Rights Reserved. HCS T Freeways Version 2023								Generat	ed: 08/23/202	23 13:32:3					

Copyright © 2023 University of Florida. All Rights Reserved.

HCS TM Freeways Version 2023 I-90 EB 2045 PM - NO BUILD.xuf

						LOS						
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	C	D	D	D	C	D	D	D	C	D	D	D
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	С	В	С	С								
					Sp	peed (mi/	′h)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	68.7	58.4	62.9	62.4	69.6	59.3	65.5	63.6	69.2	59.0	65.2	63.8
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	68.5	69.8	63.2	69.3								
					Dens	sity (pc/n	ni/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	22.3	33.1	31.5	31.8	19.8	30.3	27.8	28.6	21.1	31.4	28.3	28.9
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	22.7	14.8	22.5	20.9								
				D	emand -	Capacity	Ratio (D/	/C)				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.64	0.81	0.83	0.83	0.57	0.75	0.76	0.76	0.61	0.77	0.77	0.77
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	0.65	0.43	0.59	0.60								
					Dens	ity (veh/ı	ni/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	21.0	31.2	27.9	28.1	17.5	26.8	24.6	25.3	18.7	27.8	25.7	26.3
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	20.6	13.5	20.5	18.8								
				Density	in Ramp	Influenc	e Area (p	c/mi/ln)				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	-	30.1	-	33.0	-	28.6	-	31.0	-	29.1	-	31.4
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	-	-	22.8	-								
					Dens	sity-Base	LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	С	D	D	D	С	D	D	D	С	D	D	D
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	С	В	С	С								
					Dema	and-Base	d LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	-	-	-	-	-	-	-	-	-	-	-	-
	Seg 13	Seg 14	Seg 15	Seg 16								

AP 1	-	-	-	-								
Volume - Capacity Ratio (V/C)												
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.64	0.81	0.83	0.83	0.57	0.75	0.76	0.76	0.61	0.77	0.77	0.77
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	0.65	0.43	0.59	0.60								

# HCS Basic Freeway Report

Project Information				
Analyst	GSH	Date	2/17/23	
Agency	СМТ	Analysis Year	2045	
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV	
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary	
Segment Number	1	Segment Name	SR-2 West of I-90/SR-2 Merge	
Analysis Period Number	1	Segment Analysis Period	16:00-16:15	
Geometric Data				
Number of Lanes (N), In	2	Terrain Type	Level	
Segment Length (L), ft	5200	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	2720	Heavy Vehicle Adjustment Factor (fHV)	0.943	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1534	
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.64	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.7	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.3	
Total Ramp Density Adjustment	-	Level of Service (LOS)	С	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

Project Information							
Segment Number	2		Segment Name	I-90 at SR-	-2 Merge		
Analysis Period Number	1		Segment Analysis Period	16:00-16:1	5		
Geometric Data							
			Freeway	Freeway Ramp			
Number of Lanes (N), In			2	1			
Free-Flow Speed (FFS), mi/h			70.0	55.0			
Segment Length (L) / Acceler	ation Length (LA)	, ft	1500	830			
Terrain Type			Level	Level			
Percent Grade, %			-	-			
Segment Type / Ramp Type			Freeway	Right-Side	ed One-Lane		
Adjustment Factors							
Driver Population			All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	re Weather		
Incident Type			No Incident	-			
Proportion of CAVs in Traffic	Stream		0	-			
Final Speed Adjustment Factor	or (SAF)		1.000	1.000			
Demand Adjustment Factor (	DAF)		1.000	1.000			
Capacity Adjustment Factor f	or CAVs, CAFcav		1.000	-			
Final Capacity Adjustment Fa	ctor (CAF)		1.000	1.000			
Demand and Capacity							
Demand Volume (Vi), veh/h			2720	580			
Peak Hour Factor (PHF)			0.94	0.94			
Total Trucks, %			6.00	29.00			
Heavy Vehicle Adjustment Fa	ctor (fHV)		0.943	0.775			
Flow Rate (vi), pc/h			3069	796			
Capacity (cmd), pc/h			4800	2200			
Adjusted Capacity (cmda), pc/	'n		4800	2200			
Volume-to-Capacity Ratio (v/	′c)		0.81	0.36			
Speed and Density							
Upstream Equilibrium Distance (LEQ), ft -			Flow Outer Lanes (vOA), pc/h/l	n	-		
Downstream Equilibrium Distance (LEQ), ft		On-Ramp Influence Area Spee	ed (SR), mi/h	58.4			
Flow in Lanes 1 and 2 (v12), pc/h 3069		Outer Lanes Freeway Speed (S	70.0				
Flow Entering Ramp-Infl. Area (vR12), pc/h 3865			Ramp Junction Speed (S), mi/h 58.4				
Number of Outer Lanes on Freeway (NO), In 0			Average Density (D), pc/mi/ln         33.1				
Level of Service (LOS) D			Density in Ramp Influence Area (DR), pc/mi/ln 30.1				

HCS Basic Freeway Report					
Project Information					
Segment Number	3	Segment Name	I-90/SR-2 b/w SR-2 and SR-57		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	1980	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	3300	Heavy Vehicle Adjustment Factor (fHV)	0.885		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1984		
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.83		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	62.9		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	31.5		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information						
Segment Number 4			Segment Name	I-90 Exit Ra	amp to SR-57	
Analysis Period Number 1			Segment Analysis Period	16:00-16:1	5	
Geometric Data			•			
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ngth (LD),	ft	1500	600		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			•			
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs,	CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	F)		1.000	1.000	1.000	
Demand and Capacity			-			
Demand Volume (Vi), veh/h			3300	1010		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			13.00	6.00	6.00	
Heavy Vehicle Adjustment Factor (fHV	')		0.885	0.943	0.943	
Flow Rate (vi), pc/h			3967	1139		
Capacity (cmd), pc/h			4800	2200		
Initial Adjusted Capacity (cmda), pc/h			4800	-		
Final Adjusted Capacity (cmda), pc/h			4800	2200		
Volume-to-Capacity Ratio (v/c)			0.83	0.52	0.52	
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft	-	Flow Outer Lanes (vOA), pc/h/lr	n	-	
Downstream Equilibrium Distance (LE	Q), ft	-	Off-Ramp Influence Area Speed	d (SR), mi/h	62.4	
Flow in Lanes 1 and 2 (v12), pc/h		3967	Outer Lanes Freeway Speed (So	o), mi/h	76.8	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h		62.4	
Number of Outer Lanes on Freeway (I	NO), In	0	Average Density (D), pc/mi/ln		31.8	
Level of Service (LOS)		D	Density in Ramp Influence Area (DR), pc/mi/ln 33.0		33.0	

HCS Basic Freeway Report					
Project Information					
Segment Number	5	Segment Name	I-90 below SR-57		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	3220	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.17		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors	·	·			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	2290	Heavy Vehicle Adjustment Factor (fHV)	0.885		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1376		
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.57		
Speed and Density	·		·		
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.6		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	19.8		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project mormation						
Segment Number 6			Segment Name	I-90 Entra	nce Ramp from SR-57	
Analysis Period Number 1			Segment Analysis Period	16:00-16:1	15	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In		2	1			
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Ler	ngth (LA), ft		1500	730		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	ed One-Lane	
Adjustment Factors			8			
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Seve	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Capacity Adjustment Factor for CAVs, CAFcAv			1.000	-		
Final Capacity Adjustment Factor (CA	F)		1.000	1.000	1.000	
Demand and Capacity			•			
Demand Volume (Vi), veh/h			2290	740		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			13.00	6.00	6.00	
Heavy Vehicle Adjustment Factor (fHV	)		0.885	0.943	0.943	
Flow Rate (vi), pc/h			2753	835	835	
Capacity (cmd), pc/h			4800	2200	2200	
Adjusted Capacity (cmda), pc/h			4800	2200	2200	
Volume-to-Capacity Ratio (v/c)			0.75	0.38	0.38	
Speed and Density			-			
Upstream Equilibrium Distance (LEQ),	ft -		Flow Outer Lanes (vOA), pc/h	ı/ln	-	
Downstream Equilibrium Distance (LE	Q), ft -		On-Ramp Influence Area Spe	eed (SR), mi/h	59.3	
Flow in Lanes 1 and 2 (v12), pc/h	2753		Outer Lanes Freeway Speed	(SO), mi/h	70.0	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 3588		Ramp Junction Speed (S), mi	i/h	59.3	
Number of Outer Lanes on Freeway (I	NO), In 0		Average Density (D), pc/mi/l	n	30.3	
Level of Service (LOS)	D		Density in Ramp Influence A	rea (DR), pc/mi/ln	28.6	

HCS Basic Freeway Report							
Project Information	Project Information						
Segment Number	7	Segment Name	I-90 b/w SR-57 and SR-254				
Analysis Period Number	1	Segment Analysis Period	16:00-16:15				
Geometric Data							
Number of Lanes (N), In	2	Terrain Type	Level				
Segment Length (L), ft	7240	Percent Grade, %	-				
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-				
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83				
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0				
Right-Side Lateral Clearance, ft	-						
Adjustment Factors							
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000				
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000				
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000				
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000				
Demand and Capacity							
Demand Volume (V), veh/h	3030	Heavy Vehicle Adjustment Factor (fHV)	0.885				
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1821				
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400				
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400				
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400				
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.76				
Speed and Density							
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	65.5				
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	27.8				
Total Ramp Density Adjustment	-	Level of Service (LOS)	D				
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0						

Project information						
Segment Number 8	3		Segment Name	I-90 Exit Ra	amp to SR-254	
Analysis Period Number 1	l		Segment Analysis Period	16:00-16:1	5	
Geometric Data			•			
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD),	ft	1500	510		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			•			
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs,	, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	νF)		1.000	1.000		
Demand and Capacity			- -			
Demand Volume (Vi), veh/h			3030	600		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			13.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (fh)	/)		0.885	0.962	0.962	
Flow Rate (vi), pc/h			3642	664		
Capacity (cmd), pc/h			4800	2200		
Initial Adjusted Capacity (cmda), pc/h			4800	-		
Final Adjusted Capacity (cmda), pc/h			4800	2200		
Volume-to-Capacity Ratio (v/c)			0.76	0.30	0.30	
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft	-	Flow Outer Lanes (vOA), pc/h/li	n	-	
Downstream Equilibrium Distance (Le	EQ), ft	-	Off-Ramp Influence Area Spee	d (SR), mi/h	63.6	
Flow in Lanes 1 and 2 (v12), pc/h		3642	Outer Lanes Freeway Speed (Se	0), mi/h	76.8	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h	l	63.6	
Number of Outer Lanes on Freeway (	(No), In	0	Average Density (D), pc/mi/ln		28.6	
Level of Service (LOS)		D	Density in Ramp Influence Area (DR), pc/mi/ln 31.0		31.0	

HCS Basic Freeway Report						
Project Information						
Segment Number	9	Segment Name	I-90 below SR-254			
Analysis Period Number	1	Segment Analysis Period	16:00-16:15			
Geometric Data						
Number of Lanes (N), In	2	Terrain Type	Level			
Segment Length (L), ft	2330	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors		-				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	2430	Heavy Vehicle Adjustment Factor (fHV)	0.885			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1460			
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.61			
Speed and Density	Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.2			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.1			
Total Ramp Density Adjustment	-	Level of Service (LOS)	с			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

rioject mormation						
Segment Number	10		Segment Name	I-90 Entra	ince Ramp from SR-254	
Analysis Period Number	1		Segment Analysis Period	16:00-16:	15	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), ln		2	1			
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration L	ength (LA),	ft	1500	800		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Sid	ed One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	ar	
Weather Type			Non-Severe Weather	Non-Seve	ere Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF	)		1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs, CAFcAv		1.000	-			
Final Capacity Adjustment Factor (C	AF)		1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi), veh/h			2430	720		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			13.00	3.00	3.00	
Heavy Vehicle Adjustment Factor (f	IV)		0.885	0.971	0.971	
Flow Rate (vi), pc/h			2921	789		
Capacity (cmd), pc/h			4800	2200	2200	
Adjusted Capacity (cmda), pc/h			4800	2200	2200	
Volume-to-Capacity Ratio (v/c)			0.77	0.36	0.36	
Speed and Density						
Upstream Equilibrium Distance (LEQ	), ft	-	Flow Outer Lanes (vOA), pc/h/	ĺn	-	
Downstream Equilibrium Distance (l	_EQ), ft	-	On-Ramp Influence Area Spe	ed (SR), mi/h	59.0	
Flow in Lanes 1 and 2 (v12), pc/h		2921	Outer Lanes Freeway Speed (	SO), mi/h	70.0	
Flow Entering Ramp-Infl. Area (vR12)	), pc/h	3710	Ramp Junction Speed (S), mi/	h	59.0	
Number of Outer Lanes on Freeway	(No), In	0	Average Density (D), pc/mi/ln		31.4	
Level of Service (LOS)		D	Density in Ramp Influence Are	ea (DR), pc/mi/lr	n 29.1	

HCS Basic Freeway Report						
Project Information						
Segment Number	11	Segment Name	I-90 b/w SR-254 and SR-611			
Analysis Period Number	1	Segment Analysis Period	16:00-16:15			
Geometric Data						
Number of Lanes (N), In	2	Terrain Type	Level			
Segment Length (L), ft	11310	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors						
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	3150	Heavy Vehicle Adjustment Factor (fHV)	0.909			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1844			
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.77			
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	65.2			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	28.3			
Total Ramp Density Adjustment	-	Level of Service (LOS)	D			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

Project information						
Segment Number	12		Segment Name	I-90 Exit R	amp to SR-611	
Analysis Period Number	1		Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration L	ength (LD)	, ft	1500	510		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			•	·		
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)		1.000	1.000			
Capacity Adjustment Factor for CAVs, CAFcAv		1.000	-			
Final Capacity Adjustment Factor (CA	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			3150	490		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			10.00	10.00	10.00	
Heavy Vehicle Adjustment Factor (fH	IV)		0.909	0.909	0.909	
Flow Rate (vi), pc/h			3687	573		
Capacity (cmd), pc/h			4800	2200	2200	
Initial Adjusted Capacity (cmda), pc/h	1		4800	-		
Final Adjusted Capacity (cmda), pc/h			4800	2200		
Volume-to-Capacity Ratio (v/c)			0.77	0.26	0.26	
Speed and Density						
Upstream Equilibrium Distance (LEQ)	), ft	-	Flow Outer Lanes (vOA), pc/h/lr	ו ו	-	
Downstream Equilibrium Distance (L	.EQ), ft	-	Off-Ramp Influence Area Speed	d (SR), mi/h	63.8	
Flow in Lanes 1 and 2 (v12), pc/h		3687	Outer Lanes Freeway Speed (Sc	D), mi/h	76.8	
Flow Entering Ramp-Infl. Area (vR12)	, pc/h	-	Ramp Junction Speed (S), mi/h		63.8	
Number of Outer Lanes on Freeway	Number of Outer Lanes on Freeway (NO), In 0		Average Density (D), pc/mi/ln 28.9		28.9	
Number of Outer Lanes on Freeway (NO), In 0						

HCS Basic Freeway Report						
Project Information						
Segment Number	13	Segment Name	I-90 below SR-611 (2-lane section)			
Analysis Period Number	1	Segment Analysis Period	16:00-16:15			
Geometric Data						
Number of Lanes (N), In	2	Terrain Type	Level			
Segment Length (L), ft	850	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors						
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	2660	Heavy Vehicle Adjustment Factor (fHV)	0.909			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1556			
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.65			
Speed and Density	Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.5			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.7			
Total Ramp Density Adjustment	-	Level of Service (LOS)	с			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

HCS Basic Freeway Report						
Project Information						
Segment Number	14	Segment Name	I-90 below SR-611 (3-lane section)			
Analysis Period Number	1	Segment Analysis Period	16:00-16:15			
Geometric Data						
Number of Lanes (N), In	3	Terrain Type	Level			
Segment Length (L), ft	1710	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.67			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors						
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	2660	Heavy Vehicle Adjustment Factor (fHV)	0.909			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1038			
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.43			
Speed and Density	Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.8			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	14.8			
Total Ramp Density Adjustment	-	Level of Service (LOS)	В			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

rioject mormation						
Segment Number 1	5		Segment Name	I-90 Entra	nce Ramp from SR-611	
Analysis Period Number 1			Segment Analysis Period	16:00-16:	15	
Geometric Data			·			
		Freeway	Ramp	Ramp		
Number of Lanes (N), In			3	1	1	
Free-Flow Speed (FFS), mi/h			70.0	55.0	55.0	
Segment Length (L) / Acceleration Length (LA), ft			1500	940	940	
Terrain Type			Level	Level	Level	
Percent Grade, %			-	-	-	
Segment Type / Ramp Type			Freeway	Right-Side	Right-Sided One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	All Familiar	
Weather Type			Non-Severe Weather	Non-Seve	Non-Severe Weather	
Incident Type			No Incident	-	-	
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Capacity Adjustment Factor for CAVs, CAFCAV			1.000	-	-	
Final Capacity Adjustment Factor (CAF)			1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi), veh/h			2660	1020	1020	
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			10.00	6.00	6.00	
Heavy Vehicle Adjustment Factor (fHV)			0.909	0.943	0.943	
Flow Rate (vi), pc/h			3113	1151		
Capacity (cmd), pc/h		7200	2200	2200		
Adjusted Capacity (cmda), pc/h		7200	2200	2200		
Volume-to-Capacity Ratio (v/c)		0.59	0.52	0.52		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft	1804.5	Flow Outer Lanes (vOA), pc/h/ln 1233		1233	
Downstream Equilibrium Distance (LE	EQ), ft	-	On-Ramp Influence Area Spee	On-Ramp Influence Area Speed (SR), mi/h 61.7		
Flow in Lanes 1 and 2 (v12), pc/h		1880	Outer Lanes Freeway Speed (S	Outer Lanes Freeway Speed (SO), mi/h 67.4		
Flow Entering Ramp-Infl. Area (vR12),	pc/h	3031	Ramp Junction Speed (S), mi/h 63.2		63.2	
Sumber of Outer Lanes on Freeway (NO), In 1		Average Density (D), pc/mi/ln 22.5		22.5		
Level of Service (LOS)		с	Density in Ramp Influence Area (DR), pc/mi/ln 22.8		22.8	

HCS Basic Freeway Report Project Information						
Analysis Period Number	1	Segment Analysis Period	16:00-16:15			
Geometric Data						
Number of Lanes (N), In	3	Terrain Type	Level			
Segment Length (L), ft	3230	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors		·				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	3680	Heavy Vehicle Adjustment Factor (fHV)	0.901			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1448			
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.60			
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.3			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.9			
Total Ramp Density Adjustment	-	Level of Service (LOS)	С			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

Copyright © 2023 University of Florida. All Rights Reserved.

HCSTM Freeways Version 2023 I-90 EB 2045 PM - NO BUILD.xuf

Generated: 08/23/2023 13:32:57

## HCS Basic Freeway Report

#### **Project Information**

Project Information			
Analyst	GSH	Date	2/17/2023
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Geometric Data			
Number of Lanes (N), In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors		•	
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	1160	Heavy Vehicle Adjustment Factor (fHV)	0.775
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	796
Total Trucks, %	29.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.33
Speed and Density		•	
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	11.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		
Copyright © 2023 University of Florida. All Rights	Reserved. HCSTM Freewa	ays Version 2023	Generated: 08/23/2023 13:35

Copyright © 2023 University of Florida. All Rights Reserved.

HCS T Freeways Version 2023 I-90 EB W of SR2 Basic 2045 PM - NO BUILD.xuf Generated: 08/23/2023 13:35:01

### HCS Freeway Facilities Report

### **Project Information**

Analyst	GSH	Date	2/17/2023
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Facility Name	I-90 WB NO BUILD	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

#### Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	14
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	8.99		

### Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-90 east of SR-611	3860	3
2	Diverge	Diverge	I-90 Exit Ramp to SR-611	1500	3
3	Basic	Basic	I-90 below SR-611 (3-lane section)	1140	3
4	Basic	Basic	I-90 below SR-611 (2-lane section)	1170	2
5	Merge	Merge	I-90 Entrance Ramp from SR-611	1500	2
6	Basic	Basic	I-90 b/w SR-611 and SR-254	11410	2
7	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	2
8	Basic	Basic	I-90 below SR-254	2790	2
9	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	2
10	Basic	Basic	I-90 b/w SR-254 and SR-57	6450	2
11	Diverge	Diverge	I-90 Exit Ramp to SR-57	1500	2
12	Basic	Basic	I-90 below SR-57	2870	2
13	Weaving	Weaving	I-90 b/w SR-57 and SR-2 Weave	5300	2
14	Basic	Basic	SR-2 West of I-90/SR-2 Diverge	5000	2

### Facility Segment Data

	Segment 1: Basic														
АР	Pł	HF	fŀ	łV	Flow (pc,		Capa (pc,			/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.	94	0.9	926	314	48	720	00	0.	44	70	).0	1	5.0	В
							Segmen	t 2: Div	erge						
АР	Pł	HF	fŀ	łV	Flow (pc,		Capa (pc,			/c tio		eed i/h)		nsity ni/ln)	LOS
	F R F R Freeway Ramp Freeway Ramp F R F R Infl. F R Infl.														
1	1 0.94 0.94 0.926 0.971 3148 789 7200 2200 0.44 0.36 66.4 63.3 15.8 18.9 B														
	Segment 3: Basic														

АР	Pł	łF	f⊦	IV	Flow (pc/		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	26	232	21	720	00	0.3	32	69	9.6	1'	1.1	В
							Segme	nt 4: Ba	asic						
АР	PH	łF	f⊦	IV	Flow (pc/		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	26	232	21	480	00	0.4	48	69	9.9	16.6		
							Segmen	nt 5: Me	erge						
AP	Pł	IF	fŀ	IV	Flow (pc/		Capa (pc/		-	/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.952	2813	492	4800	2200	0.59	0.22	61.6	61.6	22.8	22.3	C
							Segme	nt 6: Ba	asic						
AP	PH	IF	f⊦	IV	Flow (pc,		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	01	290	05	480	00	0.	61	69	9.3	27	1.0	С
							Segmen	t 7: Div	erge						
AP	Pł	IF	f⊦	IV	Flow (pc,		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.980	2905	586	4800	2200	0.61	0.27	63.8	63.8	22.8	24.7	С
							Segme	nt 8: Ba	sic						
ΑΡ	PH	łF	f⊦	IV	Flow (pc/		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	001	226	67	480	00	0.4	47	69	9.8	16	5.2	В
							Segmen	nt 9: Me	erge						
AP	PH	IF	f⊦	IV	Flow (pc,		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.962	2687	420	4800	2200	0.56	0.19	62.0	62.0	21.7	21.1	C
							Segmer	nt 10: B	asic						
AP	Pł	IF	f⊦	IV	Flow (pc/		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	26	264	42	480	00	0.	55	69	9.8	18	3.9	C
						9	Segment	11: Div	/erge						
AP	Pł	IF	fŀ	IV		Flow RateCapacityd/cSpeedDensity(pc/h)(pc/h)Ratio(mi/h)(pc/mi/h)						LOS			
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.962	2642	498	4800	2200	0.55	0.23	64.0	64.0	20.6	22.7	C
							Segmer	nt 12: B	asic						
AP	Pł	IF	f⊦	IV	Flow (pc,		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	26	212	25	480	)0	0.4	44	69	9.8	15	5.2	В

АР	PHF	fHV	Flow Rate (pc/h)	Capaci (pc/h		d/c Ratio	Spee (mi/h			Density c/mi/ln)	LOS
1	0.94	0.909	3172	4554		0.70	62.0			25.6	С
Segment 14: Basic											
AP     PHF     fHV     Flow Rate (pc/h)     Capacity (pc/h)     d/c Ratio     Speed (mi/h)     Density (pc/mi/ln)     LOS											
1	0.94	0.943	2448	4800	)	0.51	70.0			17.5	В
Faci	ility Analys	alysis Results									
АР	VMT veh-mi/AP	VMT-Demand veh-mi/AP	VHD veh-h/AP	Total Delay C \$/AP	ost	Speed mi/h	Density pc/mi/ln	Dens veh/r		TT min	LOS
1	5659	5049	2.93	73.22		67.6	19.0	17	.3	8.00	С
Faci	ility Overal	l Results									
Space	e Mean Speed,	mi/h	67.6		Averag	e Density, ve	h/mi/ln	17.3	3		
Average Travel Time, min     8.00     Average Density, pc/mi/ln								19.0	)		
Total	VMT, veh-mi		5659		Total V	HD, veh-h		2.93	3		
Vehicle Value of Time (VOT), \$/h     25.00     Total Delay Cost, \$     73.22											
Copyric	nht © 2023 Univer	sity of Florida, All Rig	hts Reserved	HCSTM Freewa	vs Version	2023			Genera	ted: 08/23/2	023 13.35.5

Copyright © 2023 University of Florida. All Rights Reserved.

HCSTM Freeways Version 2023 I-90 WB 2045 AM - NO BUILD.xuf Generated: 08/23/2023 13:35:54

						LOS						
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	В	В	В	В	С	С	С	В	С	С	С	В
	Seg 13	Seg 14										
AP 1	С	В										
					S	peed (mi/	′h)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	70.0	66.4	69.6	69.9	61.6	69.3	63.8	69.8	62.0	69.8	64.0	69.8
	Seg 13	Seg 14										
AP 1	62.0	70.0										
					Dens	sity (pc/n	ni/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	15.0	15.8	11.1	16.6	22.8	21.0	22.8	16.2	21.7	18.9	20.6	15.2
	Seg 13	Seg 14										
AP 1	25.6	17.5										
				D	emand -	Capacity	Ratio (D	<b>′C)</b>				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.44	0.44	0.32	0.48	0.59	0.61	0.61	0.47	0.56	0.55	0.55	0.44
	Seg 13	Seg 14										
AP 1	0.70	0.51										
					Dens	ity (veh/ı	ni/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	13.9	14.6	10.3	15.4	21.1	18.9	20.5	14.6	19.6	17.5	19.1	14.1
	Seg 13	Seg 14										
AP 1	21.9	16.5										
				Density	in Ramp	Influenc	e Area (p	c/mi/ln)				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	-	18.9	-	-	22.3	-	24.7	-	21.1	-	22.7	-
	Seg 13	Seg 14										
AP 1	-	-										
					Dens	sity-Base	LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	В	В	В	В	С	С	С	В	С	С	С	В
	Seg 13	Seg 14										
AP 1	С	В										
					Dema	and-Base	d LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	-	-	-	-	-	-	-	-	-	-	-	-
	Seg 13	Seg 14										

AP 1	-	-										
				v	olume - O	Capacity	Ratio (V/	C)				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.44	0.44	0.32	0.48	0.59	0.61	0.61	0.47	0.56	0.55	0.55	0.44
	Seg 13	Seg 14										
AP 1	0.70	0.51										

# HCS Basic Freeway Report

Project Information			
Analyst	GSH	Date	2/17/2023
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	I-90 east of SR-611
Analysis Period Number	1	Segment Analysis Period	08:00-08:15
Geometric Data			
Number of Lanes (N), In	3	Terrain Type	Level
Segment Length (L), ft	3860	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	2740	Heavy Vehicle Adjustment Factor (fHV)	0.926
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1049
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.44
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

Project information						
Segment Number 2	2		Segment Name	I-90 Exit R	amp to SR-611	
Analysis Period Number 1	l		Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD),	ft	1500	580		
Terrain Type	errain Type		Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			•			
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs,	, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	νF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2740	720		
Peak Hour Factor (PHF)			0.94 0.94			
Total Trucks, %			8.00	3.00		
Heavy Vehicle Adjustment Factor (fh)	/)		0.926	0.971		
Flow Rate (vi), pc/h			3148	789		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h			7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.44	0.36		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft	-	Flow Outer Lanes (vOA), pc/h/ln		837	
Downstream Equilibrium Distance (Le	EQ), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	63.3	
Flow in Lanes 1 and 2 (v12), pc/h		2311	Outer Lanes Freeway Speed (SO)	, mi/h	76.8	
Flow Entering Ramp-Infl. Area (vR12),	pc/h		Ramp Junction Speed (S), mi/h 66.4		66.4	
Number of Outer Lanes on Freeway (	(NO), In	1	Average Density (D), pc/mi/ln		15.8	
Level of Service (LOS)		В	Density in Ramp Influence Area	(DR), pc/mi/ln	18.9	

	HCS Basic Freeway Report								
Project Information									
Segment Number	3	Segment Name	I-90 below SR-611 (3-lane section)						
Analysis Period Number	1	Segment Analysis Period	08:00-08:15						
Geometric Data									
Number of Lanes (N), In	3	Terrain Type	Level						
Segment Length (L), ft	1140	Percent Grade, %	-						
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-						
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.67						
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0						
Right-Side Lateral Clearance, ft	-								
Adjustment Factors									
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000						
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000						
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000						
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000						
Demand and Capacity									
Demand Volume (V), veh/h	2020	Heavy Vehicle Adjustment Factor (fHV)	0.926						
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	774						
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400						
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400						
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400						
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.32						
Speed and Density									
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.6						
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	11.1						
Total Ramp Density Adjustment	-	Level of Service (LOS)	В						
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0								

	HCS Basic Freeway Report									
Project Information										
Segment Number	4	Segment Name	I-90 below SR-611 (2-lane section)							
Analysis Period Number	1	Segment Analysis Period	08:00-08:15							
Geometric Data										
Number of Lanes (N), In	2	Terrain Type	Level							
Segment Length (L), ft	1170	Percent Grade, %	-							
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-							
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83							
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0							
Right-Side Lateral Clearance, ft	-									
Adjustment Factors										
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000							
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000							
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000							
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000							
Demand and Capacity										
Demand Volume (V), veh/h	2020	Heavy Vehicle Adjustment Factor (fHV)	0.926							
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1160							
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400							
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400							
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400							
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.48							
Speed and Density										
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9							
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.6							
Total Ramp Density Adjustment	-	Level of Service (LOS)	В							
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0									

rioject mornation						
Segment Number 5			Segment Name	I-90 Entrar	nce Ramp from SR-611	
Analysis Period Number 1			Segment Analysis Period	08:00-08:1	5	
Geometric Data			•			
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Le	ngth (LA),	ft	1500	790		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-			
Final Capacity Adjustment Factor (CAI	F)		1.000	1.000	1.000	
Demand and Capacity			•			
Demand Volume (Vi), veh/h			2020	440		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			8.00	5.00	5.00	
Heavy Vehicle Adjustment Factor (fHV	/)		0.926	0.952	0.952	
Flow Rate (vi), pc/h			2321	492	492	
Capacity (cmd), pc/h			4800	2200		
Adjusted Capacity (cmda), pc/h			4800	2200		
Volume-to-Capacity Ratio (v/c)			0.59	0.22	0.22	
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft	-	Flow Outer Lanes (vOA), pc/h/ln		-	
Downstream Equilibrium Distance (LE	:Q), ft	-	On-Ramp Influence Area Speed	(SR), mi/h	61.6	
Flow in Lanes 1 and 2 (v12), pc/h		2321	Outer Lanes Freeway Speed (SO)	, mi/h	70.0	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	2813	Ramp Junction Speed (S), mi/h	Ramp Junction Speed (S), mi/h 61.6		
Number of Outer Lanes on Freeway (I	NO), In	0	Average Density (D), pc/mi/ln		22.8	
Level of Service (LOS)		С	Density in Ramp Influence Area (	(DR), pc/mi/ln	22.3	

HCS Basic Freeway Report					
Project Information					
Segment Number	6	Segment Name	I-90 b/w SR-611 and SR-254		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	11410	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	2460	Heavy Vehicle Adjustment Factor (fHV)	0.901		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1452		
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.61		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.3		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.0		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information						
Segment Number 7			Segment Name	I-90 Exit R	amp to SR-254	
Analysis Period Number 1			Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ngth (LD),	ft	1500	500		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs, CAFcAV		1.000	-			
Final Capacity Adjustment Factor (CAF	F)		1.000	1.000	1.000	
Demand and Capacity			•			
Demand Volume (Vi), veh/h			2460	540		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			11.00	2.00	2.00	
Heavy Vehicle Adjustment Factor (fHV	')		0.901	0.980	0.980	
Flow Rate (vi), pc/h			2905	586		
Capacity (cmd), pc/h			4800	2200		
Initial Adjusted Capacity (cmda), pc/h			4800	-		
Final Adjusted Capacity (cmda), pc/h			4800	2200		
Volume-to-Capacity Ratio (v/c)			0.61	0.27		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft	-	Flow Outer Lanes (vOA), pc/h/ln		-	
Downstream Equilibrium Distance (LE	Q), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	63.8	
Flow in Lanes 1 and 2 (v12), pc/h		2905	Outer Lanes Freeway Speed (SO	), mi/h	76.8	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h 6		63.8	
Number of Outer Lanes on Freeway (I	NO), In	0	Average Density (D), pc/mi/ln		22.8	
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 24.7		24.7	
	I		8		8	

HCS Basic Freeway Report					
Project Information					
Segment Number	8	Segment Name	I-90 below SR-254		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	2790	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors	•	•	•		
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	1920	Heavy Vehicle Adjustment Factor (fHV)	0.901		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1134		
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.47		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.8		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.2		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project mormation						
Segment Number 9			Segment Name	I-90 Entra	nce Ramp from SR-254	
Analysis Period Number 1			Segment Analysis Period	08:00-08:1	15	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In		2	1			
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Le	ngth (LA), ft		1500	830		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	ed One-Lane	
Adjustment Factors			•			
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Seve	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-			
Final Capacity Adjustment Factor (CA	F)		1.000	1.000	1.000	
Demand and Capacity			-			
Demand Volume (Vi), veh/h			1920	380		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			11.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (fHV	)		0.901	0.962	0.962	
Flow Rate (vi), pc/h			2267	420	420	
Capacity (cmd), pc/h			4800	2200	2200	
Adjusted Capacity (cmda), pc/h			4800	2200	2200	
Volume-to-Capacity Ratio (v/c)			0.56	0.19	0.19	
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft -		Flow Outer Lanes (vOA), pc/h/	/ln	-	
Downstream Equilibrium Distance (LE	Q), ft -		On-Ramp Influence Area Spe	ed (SR), mi/h	62.0	
Flow in Lanes 1 and 2 (v12), pc/h	226	7	Outer Lanes Freeway Speed (	SO), mi/h	70.0	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 268	7	Ramp Junction Speed (S), mi/h 62.0		62.0	
Number of Outer Lanes on Freeway (	No), In 0		Average Density (D), pc/mi/In	1	21.7	
Level of Service (LOS)	С		Density in Ramp Influence Ar	ea (DR), pc/mi/ln	21.1	

HCS Basic Freeway Report					
Project Information					
Segment Number	10	Segment Name	I-90 b/w SR-254 and SR-57		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	6450	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	2300	Heavy Vehicle Adjustment Factor (fHV)	0.926		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1321		
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.55		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.8		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.9		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information						
Segment Number 1	11		Segment Name	I-90 Exit R	amp to SR-57	
Analysis Period Number 1	1		Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD)	, ft	1500	480		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	ed One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs	Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-		
Final Capacity Adjustment Factor (CA	νF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2300	450		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			8.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (fH)	v)		0.926	0.962	0.962	
Flow Rate (vi), pc/h			2642	498		
Capacity (cmd), pc/h			4800	2200		
Initial Adjusted Capacity (cmda), pc/h			4800	-		
Final Adjusted Capacity (cmda), pc/h			4800	2200		
Volume-to-Capacity Ratio (v/c)			0.55	0.23		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	, ft	-	Flow Outer Lanes (vOA), pc/h/ln		-	
Downstream Equilibrium Distance (Le	EQ), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	64.0	
Flow in Lanes 1 and 2 (v12), pc/h		2642	Outer Lanes Freeway Speed (SO)	, mi/h	76.8	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h 64.0		64.0	
Number of Outer Lanes on Freeway (	(No), In	0	Average Density (D), pc/mi/ln		20.6	
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 22.7		22.7	

HCS Basic Freeway Report				
Project Information				
Segment Number	12	Segment Name	I-90 below SR-57	
Analysis Period Number	1	Segment Analysis Period	08:00-08:15	
Geometric Data				
Number of Lanes (N), In	2	Terrain Type	Level	
Segment Length (L), ft	2870	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.17	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors		-		
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	1850	Heavy Vehicle Adjustment Factor (fHV)	0.926	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1062	
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.44	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.8	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.2	
Total Ramp Density Adjustment	-	Level of Service (LOS)	В	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

		HCS Freewa	y V	Veaving Repo	rt	
Project Information						
Segment Number		13		Segment Name		I-90 b/w SR-57 and SR-2 Weave
Analysis Period Number		1		Segment Analysis Pe	riod	08:00-08:15
Geometric Data						
Number of Lanes (N), In		2		Segment Type		Freeway
Segment Length (Ls), ft		4300		Number of Maneuve	r Lanes (NWL), İn	0
Weaving Configuration		Two-Sided		Ramp-to-Freeway La	ne Changes (LCRF), lc	1
Terrain Type		Level		Freeway-to-Ramp La	ne Changes (LCFR), lc	1
Percent Grade, %		-		Ramp-to-Ramp Lane	Changes (LCRR), lc	1
Interchange Density (ID), int/mi		0.67		Cross Weaving Mana	ged Lane	No
Adjustment Factors						
Driver Population	_	All Familiar	_	Final Speed Adjustme	ent Factor (SAF)	1.000
Weather Type	· .		Non-Severe Weather		Demand Adjustment Factor (DAF)	
ncident Type		No Incident		Capacity Adjustment Factor for CAVs, CAFCAV		1.000
Proportion of CAVs in Traffic Stream		0		Final Capacity Adjustment Factor (CAF)		1.000
Demand and Capacity						
		FF		RF	RR	FR
Demand Volume (Vi), veh/h	13	60	81	0	50	490
Peak Hour Factor (PHF)	0.9	94	0.9	)4	0.94	0.94
Total Trucks, %	10	.00	10.	.00	10.00	10.00
Heavy Vehicle Adjustment Factor (fHV)	0.9	909	0.9	09	0.909	0.909
Flow Rate (vi), pc/h	15	92	94	8	59	573
Weaving Flow Rate (vw), pc/h	59	1	lde	deal Conditions Capacity (cIFL), pc/h/ln		2400
Non-Weaving Flow Rate (vNW), pc/h	31	13	De	nsity-Based Capacity (	4140	
Total Flow Rate (v), pc/h	31	72	De	mand Flow-Based Cap	-	
Volume Ratio (VR)	0.0	)19	We	Weaving Area Capacity (cW), veh/h		4140
Minimum Lane Change Rate (LCMIN), lc/h	59	1	Ad	Adjusted Weaving Area Capacity (cWA), veh/h		4140
Maximum Weaving Length (LMAX), ft	59	03	Volume-to-Capacity Ratio (v/c)		0.70	
Speed and Density						
Non-Weaving Vehicle Index (INW)		897		Average Weaving Sp	eed (SW), mi/h	62.7
Non-Weaving Lane Change Rate (LCNW), lc/h 238		2383		Average Non-Weavir	ng Speed (SNW), mi/h	62.0
Weaving Lane Change Rate (LCw), lc/h		208		Average Speed (S), m	i/h	62.0
Weaving Lane Change Rate (LCAII), lc/h		2591		Density (D), pc/mi/ln		25.6
Weaving Intensity Factor (W)		0.152		Level of Service (LOS	)	С

	HCS Basic F	Freeway Report			
Project Information					
Segment Number	14	Segment Name	SR-2 West of I-90/SR-2 Diverge		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	5000	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	2170	Heavy Vehicle Adjustment Factor (fHV)	0.943		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1224		
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.51		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.5		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

HCSTM Freeways version 2023 I-90 WB 2045 AM - NO BUILD.xuf

## HCS Basic Freeway Report

#### **Project Information**

Project Information			
Analyst	GSH	Date	2/17/2023
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Geometric Data			
Number of Lanes (N), In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	540	Heavy Vehicle Adjustment Factor (fHV)	0.730
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	394
Total Trucks, %	37.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.16
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	5.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		
Copyright © 2023 University of Florida. All Rights	Reserved. HCSTM Freewa	ays Version 2023	Generated: 08/23/2023 13:40:1

Copyright © 2023 University of Florida. All Rights Reserved.

HCS TM Freeways Version 2023 I-90 WB W of SR2 Basic 2045 AM - NO BUILD.xuf Generated: 08/23/2023 13:40:13

### HCS Freeway Facilities Report

### **Project Information**

Analyst	GSH	Date	2/17/2023
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Facility Name	I-90 WB NO BUILD	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

### Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	14
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	8.99		

### Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-90 east of SR-611	3860	3
2	Diverge	Diverge	I-90 Exit Ramp to SR-611	1500	3
3	Basic	Basic	I-90 below SR-611 (3-lane section)	1140	3
4	Basic	Basic	I-90 below SR-611 (2-lane section)	1170	2
5	Merge	Merge	I-90 Entrance Ramp from SR-611	1500	2
6	Basic	Basic	I-90 b/w SR-611 and SR-254	11410	2
7	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	2
8	Basic	Basic	I-90 below SR-254	2790	2
9	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	2
10	Basic	Basic	I-90 b/w SR-254 and SR-57	6450	2
11	Diverge	Diverge	I-90 Exit Ramp to SR-57	1500	2
12	Basic	Basic	I-90 below SR-57	2870	2
13	Weaving	Weaving	I-90 b/w SR-57 and SR-2 Weave	5300	2
14	Basic	Basic	SR-2 West of I-90/SR-2 Diverge	5000	2

### Facility Segment Data

	Segment 1: Basic														
АР	(pc/h) (pc/h) Ratio (mi/h) (pc/mi/ĺn)														
1	1 0.94 0.926 5549 7200 0.77 65.1 28.4 D														
	Segment 2: Diverge														
AP     PHF     fHV     Flow Rate (pc/h)     Capacity (pc/h)     d/c     Speed (mi/h)     Density (pc/mi/ln)     LOS															
	F R F R Freeway Ramp Freeway Ramp F R F R Infl. F R Infl.														
1	1 0.94 0.94 0.926 0.971 5450 1479 7200 2200 0.77 0.67 65.1 61.6 27.9 30.7 F														
	Segment 3: Basic														

	PH	IF	fH	IV	Flow (pc,		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	26	37	18	720	00	0.	56	17	7.8	69	9.6	F
							Segme	nt 4: Ba	asic						
АР	Pŀ	IF	fH	IV	Flow (pc,		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	)4	0.9	26	363	32	480	00	0.8	83	24	1.0	75	5.5	F
							Segmen	nt 5: Me	erge						
АР	PH	IF	fH	IV	Flow (pc/		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.952	4470	838	4800	2200	1.01	0.38	53.9	53.9	41.5	35.1	F
							Segme	nt 6: Ba	asic						
ΑΡ	PH	IF	fH	IV	Flow (pc/		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	)4	0.9	001	447	70	480	00	1.0	04	57	7.6	38	3.8	F
							Segment	t 7: Div	erge						
АР	PF	IF	fH	IV	Flow (pc/		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.980	4470	1194	4800	2200	1.04	0.54	62.3	62.3	35.9	38.2	F
							Segme	nt 8: Ba	nsic						
АР	Pŀ	IF	fH	IV	Flow (pc,		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	001	327	76	480	00	0.	77	67	7.8	24	4.2	С
							Segmen	nt 9: Me	erge						
АР	Pŀ	IF	fH	IV	Flow (pc,		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.962	4017	741	4800	2200	0.92	0.34	57.5	57.5	34.9	31.3	D
							Segmen	nt 10: B	asic						
ΑΡ	PH	IF	fH	IV	Flow (pc,		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	26	401	17	480	00	0.9	91	62	2.4	32	2.2	D
						9	Segment	11: Div	/erge						
АР	PH	IF	fH	IV	Flow (pc/		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.962	4017	818	4800	2200	0.91	0.37	63.2	63.2	31.8	34.5	D
							Segmen	nt 12: B	asic						
AP	PH	IF	fH	IV	Flow (pc/		Capa (pc/			/c tio		eed i/h)	Der (pc/r	nsity ni/ln)	LOS
					(PC)	,	(P 4)					,,	(		
1	0.9	94	0.9	26	317		480		0.		-	3.3		3.3	F

AP	PHF	fHV	Flow Rate (pc/h)			d/c Ratio	Spee (mi/h		Den: (pc/m		LOS	
1	0.94	0.909	4241	4554	59.2			35.8	F			
Segment 14: Basic												
AP	AP     PHF     fHV     Flow Rate (pc/h)     Capacity (pc/h)     d/c Ratio     Speed (mi/h)     Density (pc/mi/ln)     LOS											
1	0.94	0.943	3058 4800 0.75 68.7							22.3	С	
Facility Analysis Results												
АР	VMT veh-mi/AP	VMT-Demand veh-mi/AP	VHD veh-h/AP	Total Delay C \$/AP	ost	Speed mi/h	Density pc/mi/ln	Den veh/i		TT min	LOS	
1	8682	8449	29.35	733.66		56.6	34.2	31	.4	9.50	F	
Fac	ility Overal	l Results										
Space Mean Speed, mi/h         56.6         Average Density, veh/mi/ln         31.4												
Average Travel Time, min         9.50         Average Density, pc/mi/ln							:/mi/ln	34.2	2			
Total VMT, veh-mi     8682     Total VHD, veh-h								29.3	35			
Vehicle Value of Time (VOT), \$/h         25.00         Total Delay Cost, \$							733	.66				
Copyrig	nht © 2023 Univer	sity of Florida. All Ri	ahts Reserved	HCSTM Freewa	- vs Version	2023			Genera	ted: 08/23/2	)23 13.38.42	

Copyright © 2023 University of Florida. All Rights Reserved.

HCSTM Freeways Version 2023 I-90 WB 2045 PM - NO BUILD.xuf Generated: 08/23/2023 13:38:42

AP 1         D         F         F         F         F         F         F         C         D	)S			LOS						
Seg 13         Seg 14           AP 1         E         C           Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 9         Seg 11         Seg 11         Toto         240         53.9         57.6         62.3         67.6         62.3         67.6         62.4         63.2         63.2         68.2         Seg 13         Seg 11         Seg 10         Seg 11         Seg 10         Seg 11         Seg 10         Seg 11         Seg 13         Seg 14         Seg 13         Seg 14         Seg 10         Seg 11         Seg 10         Seg 11         Seg 10           AP 1         0.77         0.77         0.56         0.83         101         104         104         0.77         0.92         0.9	g 6 Seg 7 Seg 8 Seg 9 Seg 10 Seg 11 Seg 12	7 Seg 8	Seg 7	Seg 6	Seg 5	Seg 4	Seg 3	Seg 2	Seg 1	
AP 1       F       C         Kep 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 7         AP 1       65.1       65.1       17.8       24.0       53.9       57.6       62.3       67.8       57.5       62.4       63.2       66.2         Seg 13       Seg 14       55.0       68.7       56.8       57.5       62.4       63.2       66.2         AP 1       59.2       68.7       59.3       57.6       62.3       67.8       57.5       62.4       63.2       66.2         AP 1       59.2       68.7       59.3       59.6       59.7       59.8       59.9       59.10       59.11       59.2         AP 1       59.2       68.7       59.3       59.6       59.7       59.8       59.9       59.10       59.11       59.2         AP 1       28.4       27.9       69.6       75.5       41.5       38.8       35.9       24.2       34.9       32.2       31.8       23.2         AP 1       35.8       28.93       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9	F C D D D F	С	F	F	F	F	F	F	D	AP 1
Seg1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 10         Seg 11         Seg 1         Seg 13         Seg 14         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 10         Seg 11         Seg 10         Seg 11         Seg 10         Seg 13         Seg 14         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 10         Seg 11								Seg 14	Seg 13	
Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 10AP 165.165.117.824.053.957.662.367.857.562.463.268.7AP 159.268.759.268.759.268.759.2Seg 13Seg 13Seg 14AP 159.268.759.2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 13AP 128.427.969.675.541.538.835.924.234.932.231.823.7AP 128.427.969.675.541.538.835.924.234.932.231.823.7AP 135.822.359.3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 10AP 135.822.359.3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 10AP 10.770.770.560.831.011.041.040.770.920.910.010.01Seg 13Seg 145.695.69 3Seg 7Seg 8Seg 9Seg 10Seg 11Seg 7AP 11.080.755.85Seg 7Seg 8Seg 9Seg 10Seg 11Seg 7AP 11.080.755.85 3Seg 6Seg 7Seg 8								С	F	AP 1
AP 1       65.1       65.1       17.8       24.0       53.9       57.6       62.3       67.8       57.5       62.4       63.2       68.7         AP 1       59.2       68.7       68.7       68.7       59.2       68.7       59.2       68.7       59.2       59.2       59.3       Seg 1       Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 3         AP 1       28.4       27.9       69.6       75.5       41.5       38.8       35.9       24.2       34.9       32.2       31.8       23         AP 1       28.4       27.9       69.6       75.5       41.5       38.8       35.9       24.2       34.9       32.2       31.8       23         AP 1       35.8       22.3       5       5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 1         AP 1       35.8       22.3       5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 10         AP 1       0.77       0.77       0.56       0.83       1.01       1.04	(mi/h)		′h)	peed (mi	S					
Seg 13Seg 14AP 159.268.7Seg 159.268.7Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg<9	g 6 Seg 7 Seg 8 Seg 9 Seg 10 Seg 11 Seg 12	7 Seg 8	Seg 7	Seg 6	Seg 5	Seg 4	Seg 3	Seg 2	Seg 1	
AP 1       59.2       68.7         AP 1       59.2       68.7         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 10         AP 1       28.4       27.9       69.6       75.5       41.5       38.8       35.9       24.2       34.9       32.2       31.8       23.8         AP 1       35.8       22.3       5       5       5       5       5       35.9       24.2       34.9       32.2       31.8       23.8         AP 1       35.8       22.3       5       5       5       5       5       38.8       35.9       24.2       34.9       32.2       31.8       23.8         AP 1       35.8       22.3       5	.6 62.3 67.8 57.5 62.4 63.2 68.3	3 67.8	62.3	57.6	53.9	24.0	17.8	65.1	65.1	AP 1
Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 9AP 128.427.969.675.541.538.835.924.234.932.231.822.3AP 135.822.3AP 135.822.3AP 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11AP 135.822.3AP 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 9AP 10.770.560.831.011.041.040.770.920.910.910.91AP 11.080.755eg 13Seg 141.011.041.040.770.920.910.910.91AP 11.080.75ContractionDensity (verbit/inl)ContractionSeg 13Seg 14AP 11.080.75ContractionSeg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11ContractionSeg 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 10								Seg 14	Seg 13	
Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 13AP 128.427.969.675.541.538.835.924.234.932.231.823AP 135.822.3AP 135.822.3Comparison of the seg 13Seg 14Seg 13Seg 14Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 10AP 10.770.770.560.831.011.041.040.770.920.910.910.91AP 11.080.750.755eg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 10Seg 11Seg 10AP 11.080.750.770.560.831.011.041.040.770.920.910.910.91AP 11.080.75Comparison of the seg 13Seg 14Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 7AP 11.080.75Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 7Comparison of the seg 10Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 9								68.7	59.2	AP 1
AP 1       28.4       27.9       69.6       75.5       41.5       38.8       35.9       24.2       34.9       32.2       31.8       23.5         AP 1       35.8       22.3       24.2       34.9       32.2       31.8       23.5         AP 1       35.8       22.3       24.2       34.9       32.2       31.8       23.5         AP 1       35.8       22.3       24.2       34.9       32.2       31.8       23.5         AP 1       35.8       22.3       24.2       34.9       32.2       31.8       24.5         AP 1       35.8       22.3       24.5       56.9	pc/mi/ln)		ni/ln)	sity (pc/n	Den					
Seg 13         Seg 14           AP 1         35.8         22.3           End 1         Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 13         Seg 11         Seg 13         Seg 11         Seg 13         Seg 13         Seg 14         Seg 1         Seg 13         Seg 14         Seg 13         Seg 14         Seg 13         Seg 14         Seg 13         Seg 14         Seg 15         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 14           1         1.08         0.75         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7	g 6 Seg 7 Seg 8 Seg 9 Seg 10 Seg 11 Seg 12	7 Seg 8	Seg 7	Seg 6	Seg 5	Seg 4	Seg 3	Seg 2	Seg 1	
AP 1       35.8       22.3         AP 1       35.8       22.3         Comparing the comparing	.8 35.9 24.2 34.9 32.2 31.8 23.3	9 24.2	35.9	38.8	41.5	75.5	69.6	27.9	28.4	AP 1
Demand - Sepacity Ratio (D/C)Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11Seg 10Seg 11Seg 10Seg 11Seg 10Seg 10Image: Image: Image								Seg 14	Seg 13	
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11								22.3	35.8	AP 1
AP 1       0.77       0.77       0.56       0.83       1.01       1.04       1.04       0.77       0.92       0.91       0.91       0.77         AP 1       0.78       Seg 13       Seg 14         AP 1       1.08       0.75         Density (veh/mi/ln)         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 10	city Ratio (D/C)	(D/C)	Ratio (D	Capacity	emand -	D				
Seg 13         Seg 14           AP 1         1.08         0.75           Density (veh/mi/ln)           Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 10	g 6 Seg 7 Seg 8 Seg 9 Seg 10 Seg 11 Seg 12	7 Seg 8	Seg 7	Seg 6	Seg 5	Seg 4	Seg 3	Seg 2	Seg 1	
AP 1         1.08         0.75           Density (veh/mi/ln)           Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 10	1.04         0.77         0.92         0.91         0.91         0.73	4 0.77	1.04	1.04	1.01	0.83	0.56	0.77	0.77	AP 1
Density (veh/mi/ln)         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11								Seg 14	Seg 13	
Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11								0.75	1.08	AP 1
	eh/mi/ln)	)	ni/ln)	ity (veh/	Dens					
AP 1 26.3 25.8 64.5 70.0 38.4 35.0 32.3 21.8 31.4 29.8 29.4 21	g 6 Seg 7 Seg 8 Seg 9 Seg 10 Seg 11 Seg 12	7 Seg 8	Seg 7	Seg 6	Seg 5	Seg 4	Seg 3	Seg 2	Seg 1	
	.0 32.3 21.8 31.4 29.8 29.4 21.5	3 21.8	32.3	35.0	38.4	70.0	64.5	25.8	26.3	AP 1
Seg 13 Seg 14								Seg 14	Seg 13	
AP 1 32.5 21.0								21.0	32.5	AP 1
Density in Ramp Influence Area (pc/mi/ln)	ience Area (pc/mi/ln)	a (pc/mi/ln)	e Area (p	Influenc	in Ramp	Density				
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11	g 6 Seg 7 Seg 8 Seg 9 Seg 10 Seg 11 Seg 12	7 Seg 8	Seg 7	Seg 6	Seg 5	Seg 4	Seg 3	Seg 2	Seg 1	
AP 1         -         30.7         -         35.1         -         38.2         -         31.3         -         34.5         -	<mark>- 38.2 - 31.3 - 34.5</mark> -	2 -	38.2	-	35.1	-	-	30.7	-	AP 1
Seg 13     Seg 14								Seg 14	Seg 13	
AP 1								-	-	AP 1
Density-Based LOS	ased LOS		LOS	sity-Base	Dens					
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg	g 6 Seg 7 Seg 8 Seg 9 Seg 10 Seg 11 Seg 12	7 Seg 8	Seg 7	Seg 6	Seg 5	Seg 4	Seg 3	Seg 2	Seg 1	
AP1 D D F F E E E C D D D C	E C D D D C	С	E	E	E	F	F	D	D	AP 1
Seg 13 Seg 14								Seg 14	Seg 13	
AP1 E C								С	E	AP 1
Demand-Based LOS	Based LOS	5	d LOS	and-Base	Dem					
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg	g 6 Seg 7 Seg 8 Seg 9 Seg 10 Seg 11 Seg 12	7 Seg 8	Seg 7	Seg 6	Seg 5	Seg 4	Seg 3	Seg 2	Seg 1	
AP1 F F F	F	-	F	F	F	-	-	-	-	AP 1
Seg 13 Seg 14								Seg 14	Seg 13	

AP 1	F	-										
				v	olume - (	Capacity	Ratio (V/	C)				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.77	0.76	0.52	0.76	0.93	0.93	0.93	0.68	0.84	0.84	0.84	0.66
	Seg 13	Seg 14										
AP 1	0.93	0.64										

# HCS Basic Freeway Report

Project Information			
Analyst	GSH	Date	2/17/2023
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	I-90 east of SR-611
Analysis Period Number	1	Segment Analysis Period	16:00-16:15
Geometric Data			
Number of Lanes (N), In	3	Terrain Type	Level
Segment Length (L), ft	3860	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	4830	Heavy Vehicle Adjustment Factor (fHV)	0.926
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1850
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.77
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	65.1
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	28.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

Project information					
Segment Number 2			Segment Name	I-90 Exit R	amp to SR-611
Analysis Period Number 1			Segment Analysis Period	16:00-16:1	5
Geometric Data			<u>.</u>		
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			70.0	55.0	
Segment Length (L) / Deceleration Leng	gth (LD), ft		1500	580	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors		<u>^</u>			
Driver Population			All Familiar	All Familia	
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident		
Proportion of CAVs in Traffic Stream			0	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000	
Capacity Adjustment Factor for CAVs, C	CAFCAV		1.000	-	
Final Capacity Adjustment Factor (CAF)	1		1.000		
Demand and Capacity					
Demand Volume (Vi), veh/h			4830	1350	
Peak Hour Factor (PHF)			0.94	0.94	
Total Trucks, %			8.00	3.00	
Heavy Vehicle Adjustment Factor (fHV)			0.926	0.971	
Flow Rate (vi), pc/h			5549	1479	
Capacity (cmd), pc/h			7200	2200	
Initial Adjusted Capacity (cmda), pc/h			7200	-	
Final Adjusted Capacity (cmda), pc/h			7200	2200	
Volume-to-Capacity Ratio (v/c)			0.76	0.67	
Speed and Density					
Upstream Equilibrium Distance (LEQ), ft	t -		Flow Outer Lanes (vOA), pc/h	h/ln	1763
Downstream Equilibrium Distance (LEQ)	), ft -		Off-Ramp Influence Area Sp	eed (SR), mi/h	61.6
Flow in Lanes 1 and 2 (v12), pc/h	368	37	Outer Lanes Freeway Speed	(SO), mi/h	73.8
Flow Entering Ramp-Infl. Area (vR12), p	c/h -		Ramp Junction Speed (S), m	ii/h	65.1
Number of Outer Lanes on Freeway (Ne	0), ln 1		Average Density (D), pc/mi/	In	27.9
Level of Service (LOS) F			Density in Ramp Influence Area (DR), pc/mi/ln 30.7		

	HCS Basic Fr	eeway Report							
Project Information									
Segment Number	3	Segment Name	I-90 below SR-611 (3-lane section)						
Analysis Period Number	1	Segment Analysis Period	16:00-16:15						
Geometric Data									
Number of Lanes (N), In	3	Terrain Type	Level						
Segment Length (L), ft	1140	Percent Grade, %	-						
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-						
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.67						
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0						
Right-Side Lateral Clearance, ft	-								
Adjustment Factors									
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000						
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000						
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000						
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000						
Demand and Capacity									
Demand Volume (V), veh/h	3480	Heavy Vehicle Adjustment Factor (fHV)	0.926						
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1333						
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400						
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400						
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400						
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.52						
Speed and Density									
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	17.8						
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	69.6						
Total Ramp Density Adjustment	-	Level of Service (LOS)	F						
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0								

	HCS Basic Fr	eeway Report							
Project Information									
Segment Number	4	Segment Name	I-90 below SR-611 (2-lane section)						
Analysis Period Number	1	Segment Analysis Period	16:00-16:15						
Geometric Data									
Number of Lanes (N), In	2	Terrain Type	Level						
Segment Length (L), ft	1170	Percent Grade, %	-						
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-						
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83						
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0						
Right-Side Lateral Clearance, ft	-								
Adjustment Factors									
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000						
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000						
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000						
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000						
Demand and Capacity									
Demand Volume (V), veh/h	3480	Heavy Vehicle Adjustment Factor (fHV)	0.926						
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1999						
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400						
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400						
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400						
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.76						
Speed and Density									
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	24.0						
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	75.5						
Total Ramp Density Adjustment	-	Level of Service (LOS)	F						
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0								

rioject mormation					
Segment Number 5		Segment Name	I-90 Entra	nce Ramp from SR-611	
Analysis Period Number 1		Segment Analysis Period	16:00-16:1	15	
Geometric Data					
		Freeway	Ramp		
Number of Lanes (N), In		2	1		
Free-Flow Speed (FFS), mi/h		70.0	55.0		
Segment Length (L) / Acceleration Lei	ngth (LA), ft	1500	790		
Terrain Type		Level	Level		
Percent Grade, %		-	-		
Segment Type / Ramp Type		Freeway	Right-Side	ed One-Lane	
Adjustment Factors					
Driver Population		All Familiar	All Familia	r	
Weather Type		Non-Severe Weather	Non-Seve	re Weather	
Incident Type		No Incident	-		
Proportion of CAVs in Traffic Stream		0	-		
Final Speed Adjustment Factor (SAF)		1.000	1.000		
Demand Adjustment Factor (DAF)		1.000	1.000		
Capacity Adjustment Factor for CAVs,	CAFcav	1.000	-		
Final Capacity Adjustment Factor (CAI	-)	1.000	) 1.000		
Demand and Capacity		·			
Demand Volume (Vi), veh/h		3480	750		
Peak Hour Factor (PHF)		0.94	0.94		
Total Trucks, %		8.00	5.00		
Heavy Vehicle Adjustment Factor (fHV	)	0.926	0.952		
Flow Rate (vi), pc/h		3998	838		
Capacity (cmd), pc/h		4800	2200		
Adjusted Capacity (cmda), pc/h		4800	2200		
Volume-to-Capacity Ratio (v/c)		0.93	0.38		
Speed and Density					
Upstream Equilibrium Distance (LEQ),	ft -	Flow Outer Lanes (vOA), pc,	/h/ln	-	
Downstream Equilibrium Distance (LE	Q), ft -	On-Ramp Influence Area S	peed (SR), mi/h	53.9	
Flow in Lanes 1 and 2 (v12), pc/h	3632	Outer Lanes Freeway Spee	d (So), mi/h	70.0	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 4470	Ramp Junction Speed (S), r	mi/h	53.9	
Number of Outer Lanes on Freeway (No), In 0		Average Density (D), pc/mi	Average Density (D), pc/mi/ln 41.5		
Level of Service (LOS)	F	Density in Ramp Influence	Area (DR), pc/mi/ln	35.1	

HCS Basic Freeway Report Project Information					
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	11410	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	4230	Heavy Vehicle Adjustment Factor (fHV)	0.901		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	2235		
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.93		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	57.6		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	38.8		
Total Ramp Density Adjustment	-	Level of Service (LOS)	F		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information					
Segment Number 7		Segment Name	I-90 Exit R	amp to SR-254	
Analysis Period Number 1		Segment Analysis Period	16:00-16:1	5	
Geometric Data					
		Freeway	Ramp		
Number of Lanes (N), In		2	1	1	
Free-Flow Speed (FFS), mi/h		70.0	55.0	55.0	
Segment Length (L) / Deceleration Length (I	_D), ft	1500	500	500	
Terrain Type		Level	Level	Level	
Percent Grade, %		-	-	-	
Segment Type / Ramp Type		Freeway	Right-Side	Right-Sided One-Lane	
Adjustment Factors		· · · ·			
Driver Population		All Familiar	All Familia	All Familiar	
Weather Type		Non-Severe Weather	Non-Seve	re Weather	
Incident Type		No Incident	-		
Proportion of CAVs in Traffic Stream		0	-	-	
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000	
Demand Adjustment Factor (DAF)		1.000	1.000	1.000	
Capacity Adjustment Factor for CAVs, CAFCA	V	1.000	-	-	
Final Capacity Adjustment Factor (CAF)		1.000	1.000	1.000	
Demand and Capacity					
Demand Volume (Vi), veh/h		4230	1100	1100	
Peak Hour Factor (PHF)		0.94	0.94	0.94	
Total Trucks, %		11.00	2.00	2.00	
Heavy Vehicle Adjustment Factor (fHV)		0.901	0.980	0.980	
Flow Rate (vi), pc/h		4994	1194	1194	
Capacity (cmd), pc/h		4800	2200	2200	
Initial Adjusted Capacity (cmda), pc/h		4800	-	-	
Final Adjusted Capacity (cmda), pc/h		4800	2200	2200	
Volume-to-Capacity Ratio (v/c)		0.93	0.54	0.54	
Speed and Density					
Upstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/l	Flow Outer Lanes (vOA), pc/h/ln		
Downstream Equilibrium Distance (LEQ), ft	-	Off-Ramp Influence Area Spee	Off-Ramp Influence Area Speed (SR), mi/h		
Flow in Lanes 1 and 2 (v12), pc/h	4470	Outer Lanes Freeway Speed (S	Outer Lanes Freeway Speed (SO), mi/h		
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Ramp Junction Speed (S), mi/h	Ramp Junction Speed (S), mi/h		
Number of Outer Lanes on Freeway (NO), In	0	Average Density (D), pc/mi/ln	Average Density (D), pc/mi/ln		
Level of Service (LOS) F			Density in Ramp Influence Area (DR), pc/mi/ln 38.2		

HCS Basic Freeway Report						
Project Information						
Segment Number	8	Segment Name	I-90 below SR-254			
Analysis Period Number	1	Segment Analysis Period	16:00-16:15			
Geometric Data						
Number of Lanes (N), In	2	Terrain Type	Level			
Segment Length (L), ft	2790	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors	•					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	3130	Heavy Vehicle Adjustment Factor (fHV)	0.901			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1638			
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.68			
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	67.8			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	24.2			
Total Ramp Density Adjustment	-	Level of Service (LOS)	С			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

Project mormation						
Segment Number 9			Segment Name	I-90 Entra	ance Ramp from SR-254	
Analysis Period Number 1			Segment Analysis Period	16:00-16:	15	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1	1	
Free-Flow Speed (FFS), mi/h			70.0	55.0	55.0	
Segment Length (L) / Acceleration Le	ngth (LA), ft		1500	830	830	
Terrain Type			Level	Level	Level	
Percent Grade, %			-	-	-	
Segment Type / Ramp Type			Freeway	Right-Sid	Right-Sided One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	ar	
Weather Type			Non-Severe Weather	Non-Seve	Non-Severe Weather	
Incident Type			No Incident	-	-	
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Capacity Adjustment Factor for CAVs, CAFcAV			1.000	-	-	
Final Capacity Adjustment Factor (CA	F)		1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi), veh/h			3130	670	670	
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			11.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (fHV	)		0.901	0.962	0.962	
Flow Rate (vi), pc/h			3696	741	741	
Capacity (cmd), pc/h			4800	2200	2200	
Adjusted Capacity (cmda), pc/h			4800	2200	2200	
Volume-to-Capacity Ratio (v/c)		0.84	0.34	0.34		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft -		Flow Outer Lanes (vOA), pc/h/ln		-	
Downstream Equilibrium Distance (LE	Q), ft -		On-Ramp Influence Area Speed (SR), mi/h 5		57.5	
Flow in Lanes 1 and 2 (v12), pc/h	3276		Outer Lanes Freeway Speed (SO), mi/h		70.0	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 4017		Ramp Junction Speed (S), mi/h		57.5	
Number of Outer Lanes on Freeway (	er Lanes on Freeway (NO), In 0		Average Density (D), pc/mi/ln34.9		34.9	
Level of Service (LOS) D			Density in Ramp Influence Area (DR), pc/mi/ln 31.3		n 31.3	

HCS Basic Freeway Report Project Information					
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	6450	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	3800	Heavy Vehicle Adjustment Factor (fHV)	0.926		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	2009		
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.84		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	62.4		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	32.2		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information						
Segment Number	11		Segment Name	I-90 Exit R	amp to SR-57	
Analysis Period Number	1		Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0	55.0	
Segment Length (L) / Deceleration Le	ength (LD)	, ft	1500	480	480	
Terrain Type			Level	Level	Level	
Percent Grade, %			-	-	-	
Segment Type / Ramp Type			Freeway	Right-Side	Right-Sided One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	All Familiar	
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-	-		
Final Capacity Adjustment Factor (CA	NF)		1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi), veh/h			3800	740	740	
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			8.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (fHV)		0.926	0.962	0.962		
Flow Rate (vi), pc/h			4366	818	818	
Capacity (cmd), pc/h		4800	2200	2200		
Initial Adjusted Capacity (cmda), pc/h		4800	-	-		
Final Adjusted Capacity (cmda), pc/h			4800	2200	2200	
Volume-to-Capacity Ratio (v/c)		0.84	0.37	0.37		
Speed and Density						
Upstream Equilibrium Distance (LEQ)	, ft	-	Flow Outer Lanes (vOA), pc/h/ln		-	
Downstream Equilibrium Distance (L	EQ), ft	-	Off-Ramp Influence Area Speed (SR), mi/h		63.2	
Flow in Lanes 1 and 2 (v12), pc/h		4017	Outer Lanes Freeway Speed (SO), mi/h		76.8	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h		63.2	
Number of Outer Lanes on Freeway (No), In 0		Average Density (D), pc/mi/ln 31.8		31.8		
Level of Service (LOS) D		Density in Ramp Influence Area (DR), pc/mi/ln 34.5		34.5		

HCS Basic Freeway Report										
Project Information										
Segment Number	12	Segment Name	I-90 below SR-57							
Analysis Period Number	1	Segment Analysis Period	16:00-16:15							
Geometric Data										
Number of Lanes (N), In	2	Terrain Type	Level							
Segment Length (L), ft	2870	Percent Grade, %	-							
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-							
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.17							
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0							
Right-Side Lateral Clearance, ft	-									
Adjustment Factors	•									
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000							
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000							
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000							
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000							
Demand and Capacity										
Demand Volume (V), veh/h	3060	Heavy Vehicle Adjustment Factor (fHV)	0.926							
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1589							
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400							
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400							
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400							
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.66							
Speed and Density										
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.3							
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	23.3							
Total Ramp Density Adjustment	-	Level of Service (LOS)	F							
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0									

		HCS Freeway	y V	Veaving Repo	ort	
Project Information			_			
Segment Number		13		Segment Name		I-90 b/w SR-57 and SR-2 Weave
Analysis Period Number		1		Segment Analysis Pe	16:00-16:15	
Geometric Data						
Number of Lanes (N), In		2		Segment Type		Freeway
Segment Length (Ls), ft		4300		Number of Maneuve	r Lanes (NwL), ln	0
Weaving Configuration		Two-Sided		Ramp-to-Freeway La	ne Changes (LCRF), lc	1
Terrain Type		Level		Freeway-to-Ramp La	ne Changes (LCFR), lc	1
Percent Grade, %		-		Ramp-to-Ramp Lane	Changes (LCRR), lc	1
Interchange Density (ID), int/mi		0.67		Cross Weaving Mana	iged Lane	No
Adjustment Factors				·		•
Driver Population		All Familiar		Final Speed Adjustme	ent Factor (SAF)	1.000
Weather Type		Non-Severe Weath	er	Demand Adjustment	1.000	
Incident Type		No Incident		Capacity Adjustment	1.000	
Proportion of CAVs in Traffic Stream		0		Final Capacity Adjust	ment Factor (CAF)	1.000
Demand and Capacity						
		FF		RF	RR	FR
Demand Volume (Vi), veh/h	21	30	108	30	80	930
Peak Hour Factor (PHF)	0.9	)4	0.9	4	0.94	0.94
Total Trucks, %	10	.00	10.	00	10.00	10.00
Heavy Vehicle Adjustment Factor (fHV)	0.9	909	0.9	09	0.909	0.909
Flow Rate (vi), pc/h	22	12	97(	0	94	965
Weaving Flow Rate (vw), pc/h	94		lde	al Conditions Capacity	/ (cIFL), pc/h/ln	2400
Non-Weaving Flow Rate (vNW), pc/h	41	47	De	nsity-Based Capacity (	cIWL × N × fHV), veh/h	4140
Total Flow Rate (v), pc/h	42	41	De	mand Flow-Based Cap	oacity (cIW × fHV), veh/h	-
Volume Ratio (VR)	0.0	)19	We	eaving Area Capacity (	cw), veh/h	4140
Minimum Lane Change Rate (LCMIN), lc/h	94		Ad	justed Weaving Area (	Capacity (cwA), veh/h	4140
Maximum Weaving Length (LMAX), ft	59	03	Vo	lume-to-Capacity Ratio	o (v/c)	0.93
Speed and Density						
Non-Weaving Vehicle Index (INW)		1195		Average Weaving Sp	eed (Sw), mi/h	62.3
Non-Weaving Lane Change Rate (LCNW), lc/h		2614		Average Non-Weavir	ng Speed (SNW), mi/h	59.1
Neaving Lane Change Rate (LCw), lc/h				Average Speed (S), m	ni/h	59.2
Weaving Lane Change Rate (LCAII), lc/h		2857		Density (D), pc/mi/ln		35.8
Weaving Intensity Factor (W)		0.164		Level of Service (LOS	F	

	HCS Basic F	Freeway Report							
Project Information									
Segment Number	14	Segment Name	SR-2 West of I-90/SR-2 Diverge						
Analysis Period Number	1	Segment Analysis Period	16:00-16:15						
Geometric Data									
Number of Lanes (N), In	2	Terrain Type	Level						
Segment Length (L), ft	5000	Percent Grade, %	-						
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-						
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00						
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0						
Right-Side Lateral Clearance, ft	-								
Adjustment Factors									
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000						
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000						
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000						
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000						
Demand and Capacity									
Demand Volume (V), veh/h	3210	Heavy Vehicle Adjustment Factor (fHV)	0.943						
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1529						
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2400						
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400						
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400						
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.64						
Speed and Density									
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.7						
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.3						
Total Ramp Density Adjustment	-	Level of Service (LOS)	С						
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0								

HCS 1000 Freeways version 2020 I-90 WB 2045 PM - NO BUILD.xuf

### HCS Basic Freeway Report

#### **Project Information**

Project Information				
Analyst	GSH	Date	2/17/2023	
Agency	CMT	Analysis Year	2045	
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV	
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary	
Geometric Data				
Number of Lanes (N), In	2	Terrain Type	Level	
Segment Length (L), ft	-	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	1010	Heavy Vehicle Adjustment Factor (fHV)	0.730	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	736	
Total Trucks, %	37.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.31	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	10.5	
Total Ramp Density Adjustment	-	Level of Service (LOS)	A	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			
Copyright © 2023 University of Florida. All Rights	Reserved. HCSTM Freewa	ays Version 2023	Generated: 08/23/2023 13:40	

Copyright © 2023 University of Florida. All Rights Reserved.

HCS T Freeways Version 2023 I-90 WB W of SR2 Basic 2045 PM - NO BUILD.xuf Generated: 08/23/2023 13:40:40

# EASTBOUND I-90 / SR-2 TSMO BUILD CONFIGURATION

### HCS Freeway Facilities Report

#### 

Proje	ct Inform	ation								
Analyst			GSH		Date			2/17/23		
Agency			СМТ		Analysi	s Year		2045		
Jurisdict	tion		ODOT District 3		Time A	nalyzed		AM DH	/	
Facility I	Name		I-90 EB BUILD C AND 3	PTIONS 2	Units			U.S. Cus	tomary	
Project	Description		PID 107714 LOF	R-90-10.76						
Facilit	ty Global	Input								
Jam Der	nsity, pc/mi/lı	า	190.0		Density	at Capacity, pc/ı	mi/ln	45.0		
Queue [	Discharge Ca	pacity Drop, %	6 7		Total Se	egments		16		
Total An	alysis Period	5	1		Analysi	s Period Duratior	ı, min	15		
Facility I	Length, mi		9.01							
Facilit	ty Segme	nt Data								
No.	Cod	ed	Analyzed		Name		Length	, ft	Lanes	
1	Bas	ic	Basic	SR-2 West	: of I-90/	SR-2 Merge	5200	5200		
2	Mer	ge	Merge	I-90	at SR-2 I	Verge	1500	)	2	
3	Bas	ic	Basic	I-90/SR-2 b/w SR-2 and SR-57 (2-Lane)			780		2	
4	Bas	ic	Basic	I-90/SR-2 b/w	SR-2 and	l SR-57 (3-Lane)	1200	)	3	
5	Dive	rge	Diverge	I-90 Ex	it Ramp	to SR-57	1500	)	3	
6	Bas	ic	Basic	I-90	) below S	R-57	3220	)	3	
7	Mer	ge	Merge	I-90 Entran	ice Ramp	from SR-57	1500	0 3		
8	Bas	ic	Basic	I-90 b/w	SR-57 a	nd SR-254	7240	40		
9	Dive	rge	Diverge	I-90 Exi	t Ramp t	o SR-254	1500	1500		
10	Bas	ic	Basic	I-90	below S	R-254	2330	)	3	
11	Mer	ge	Merge	I-90 Entrand	ce Ramp	from SR-254	1500	)	3	
12	Bas	ic	Basic	I-90 b/w	SR-254 a	nd SR-611	1131	0	3	
13	Dive	rge	Diverge	I-90 Exit	t Ramp t	o SR-611	1500	)	3	
14	Bas	ic	Basic	I-90 below S	SR-611 (3	-lane section)	2560	) 3		
15	Mer	ge	Merge	I-90 Entrand	ce Ramp	from SR-611	1500	)	3	
16	Bas	ic	Basic	I-90	east of S	R-611	3230	)	3	
Facilit	ty Segme	nt Data								
				Segmen	t 1: Ba	sic				
AP	PHF	fHV	Flow Rate (pc/h)	Capaci (pc/h		d/c Ratio			Density (pc/mi/ln)	LOS
1	0.94	0.943	3035	4800	)	0.63	68.8		22.1	С
				Segment	: 2: Me	erge				

	Segment 2: Merge														
AP	P	HF	fŀ	IV	Flow (pc,		Capa (pc,	,	d/c Speed Ratio (mi/h)					LOS	
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	

1	0.94	0.94	0.943	0.775	4655	1620	4800	2200	0.97	0.74	52.7	52.7	44.2	35.9	E
							Segme								
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/	city	d, Ra		Spo (mi		Den (pc/n	isity ni/ln)	LOS
1	0.9	94	0.8	885	46	52	480	00	0.9	97	55	5.3	42	2.1	E
							Segme	nt 4: Ba	asic						
АР	Pł	łF	fŀ	IV	Flow (pc,		Capacity (pc/h)		d/c Ratio		Spo (mi		Den (pc/n	isity ni/ln)	LOS
1	0.9	94	0.8	85	46	52	720	00	0.6	65	67	7.0	22	2.6	С
							Segmen	t 5: Div	erge						
AP	Pł	łF	f⊦	IV	Flow (pc,		Capa (pc/		d, Ra		Spo (mi		Den (pc/n	sity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.943	4652	1196	7200	2200	0.65	0.54	65.7	62.3	23.6	26.6	C
	Segment 6: Basic														
AP	Pł	łF	f⊦	iv	Flow (pc,		Capa (pc/		d, Ra		Spe (mi			isity ni/ln)	LOS
1	0.9	94	0.8	85	33	78	720	00	0.47 69.9		9.9	16	5.1	В	
Segment 7: Merge															
AP	Pł	łF	fŀ	iV	Flow (pc,		Capa (pc,		d, Ra		Spo (mi		Den (pc/n	sity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.943	4247	869	7200	2200	0.59	0.39	63.0	61.3	22.5	23.1	С
							Segme		1						
AP	Pł		fŀ		Flow (pc,	/h)			sity ni/ln)	LOS					
1	0.9	94	0.8	885	430		720		0.6	60	69	).4	20	).7	С
							Segmen								
AP	Pł	4F	fF	IV	Flow (pc,		Capa (pc/		d, Ra		Spo (mi			sity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.962	4303	641	7200	2200	0.60	0.29	67.0	63.7	21.4	24.8	C
							Segmer	nt 10: B	asic						
АР	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra		Spo (mi		Den (pc/n	isity ni/ln)	LOS
1	0.9	94	0.8	885	36		720		0.!	50	69	9.9	17	7.2	В
							Segmen	t 11: M	erge	,					
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra		Spo (mi	i/h)		isity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.971	4493	887	7200	2200	0.62	0.40	62.8	61.2	23.8	23.9	С
							Segmer								
AP	Pł	łF	f F	iV	Flow (pc,		Capa (pc/		d, Ra		Spo (mi		Den (pc/n	sity ni/ln)	LOS

1	0.	94	0.9	909	44	59	720	00	0.	62	69	9.1		21.5	С
							Segment	13: Di	verge						
AP	PI	HF	fł	IV	Flow (pc,		Capa (pc,			/c tio		eed i/h)		)ensity c/mi/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.909	0.909	4459	737	7200	2200	0.62	0.34	66.7	63.4	22.3	25.7	C
							Segmer	nt 14: B	asic						
ΑΡ	PI	HF	fł	łV	Flow (pc,		Capa (pc,			d/c Speed Ratio (mi/h)				)ensity c/mi/ln)	LOS
1	0.	94	0.9	909	372	22	720	00	0.	52	69	9.9		17.7	В
							Segmen	t 15: M	erge						
АР	PI	HF	fł	IV	Flow (pc,		Capa (pc,			/c tio		eed i/h)		)ensity c/mi/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.909	0.943	5290	1568	7200	2200	0.73	0.71	60.3	58.2	29.2	30.3	D
							Segmer	nt 16: B	asic						
ΑΡ	PI	HF	fł	łV	Flow (pc,		Capa (pc,		d/c Speed Ratio (mi/h)			)ensity c/mi/ln)	LOS		
1	0.	94	0.9	901	539	396         7200         0.75         65.8		65.8		27.3	D				
Faci	lity A	nalysi	is Res	ults											
AP	VM veh-mi			Deman -mi/AP	-	HD -h/AP	Total Delay \$/AP	Cost	Speed mi/h		Density pc/mi/ln		isity mi/ln	TT min	LOS
1	858	1	7	7766	5	.96	148.89		66.8		22.2 2		0.0	8.10	С
Faci	lity O	verall	Resu	lts											
Space	e Mean S	Speed, r	mi/h		66.8			Averag	e Densi	ty, veh/	/mi/ln	20.	0		
Avera	ige Trave	el Time,	min		8.10			Averag	e Densi <sup>.</sup>	ty, pc/r	ni/ln	22.	2		
Total	VMT, ve	h-mi			8581			Total V	HD, veh	-h		5.9	6		
Vehic	le Value	of Time	e (VOT),	\$/h	25.00			Total D	elay Co	st, \$		14	3.89		
Copyright © 2023 University of Florida. All Rights Reserved. HCSTM Freeways Version 2023 Generated: 08/24/2023 15:04:5															

Copyright © 2023 University of Florida. All Rights Reserved.

HCS T Freeways Version 2023 I-90 EB 2045 AM - OPTION 2 AND 3 TSMO.xuf Generated: 08/24/2023 15:04:53

						LOS						
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	С	E	E	С	С	В	С	С	С	В	С	С
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	С	В	D	D								
					S	peed (mi/	′h)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	68.8	52.7	55.3	67.0	65.7	69.9	63.0	69.4	67.0	69.9	62.8	69.1
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	66.7	69.9	60.3	65.8								
					Dens	sity (pc/n	ni/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	22.1	44.2	42.1	22.6	23.6	16.1	22.5	20.7	21.4	17.2	23.8	21.5
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	22.3	17.7	29.2	27.3								
				D	emand -	Capacity	Ratio (D	<b>′C)</b>				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.63	0.97	0.97	0.65	0.65	0.47	0.59	0.60	0.60	0.50	0.62	0.62
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	0.62	0.52	0.73	0.75								
					Dens	ity (veh/ı	ni/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	20.8	41.7	37.3	20.0	20.9	14.2	19.9	18.3	18.9	15.2	21.1	19.5
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	20.3	16.1	26.5	24.6								
				_	-	Influenc	-					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	-	35.9	-	-	26.6	-	23.1	-	24.8	-	23.9	-
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	25.7	-	30.3	-	_	• -						
						sity-Based						
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	C	E	E	C	С	В	С	С	С	В	С	С
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	С	В	D	D	-		1100					
						and-Base						
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	-	-	-	-	-	-	-	-	-	-	-	-
	Seg 13	Seg 14	Seg 15	Seg 16								

AP 1	-	-	-	-									
	Volume - Capacity Ratio (V/C)												
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12	
AP 1	0.63	0.97	0.97	0.65	0.65	0.47	0.59	0.60	0.60	0.50	0.62	0.62	
	Seg 13	Seg 14	Seg 15	Seg 16									
AP 1	0.62	0.52	0.73	0.75									

# HCS Basic Freeway Report

Project Information			
Analyst	GSH	Date	2/17/23
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	SR-2 West of I-90/SR-2 Merge
Analysis Period Number	1	Segment Analysis Period	08:00-08:15
Geometric Data			
Number of Lanes (N), In	2	Terrain Type	Level
Segment Length (L), ft	5200	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000
Demand and Capacity			
Demand Volume (V), veh/h	2690	Heavy Vehicle Adjustment Factor (fHV)	0.943
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1518
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.63
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	с
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

Project Information					
Segment Number	2		Segment Name	I-90 at SR-	2 Merge
Analysis Period Number	1		Segment Analysis Period	08:00-08:1	5
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			2	1	
Free-Flow Speed (FFS), mi/h			70.0	55.0	
Segment Length (L) / Acceler	ation Length (LA)	, ft	1500	830	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	r
Weather Type			Non-Severe Weather	Non-Sever	re Weather
Incident Type			No Incident	-	
Proportion of CAVs in Traffic	Stream		0	-	
Final Speed Adjustment Facto	or (SAF)		1.000	1.000	
Demand Adjustment Factor (	DAF)		1.000	1.000	
Capacity Adjustment Factor f	or CAVs, CAFcav		1.000	-	
Final Capacity Adjustment Fa	ctor (CAF)		1.000	1.000	
Demand and Capacity					
Demand Volume (Vi), veh/h			2690	1180	
Peak Hour Factor (PHF)			0.94	0.94	
Total Trucks, %			6.00	29.00	
Heavy Vehicle Adjustment Fa	ctor (fHV)		0.943	0.775	
Flow Rate (vi), pc/h			3035	1620	
Capacity (cmd), pc/h			4800	2200	
Adjusted Capacity (cmda), pc/	'n		4800	2200	
Volume-to-Capacity Ratio (v/	′c)		0.97	0.74	
Speed and Density					
Upstream Equilibrium Distance (LEQ), ft -		-	Flow Outer Lanes (vOA), pc/h/l	n	-
Downstream Equilibrium Dist	ance (LEQ), ft	-	On-Ramp Influence Area Speed (SR), mi/h 52.7		52.7
Flow in Lanes 1 and 2 (v12), p	c/h	3035	Outer Lanes Freeway Speed (S	0), mi/h	70.0
Flow Entering Ramp-Infl. Area	a (vR12), pc/h	4655	Ramp Junction Speed (S), mi/h	1	52.7
Number of Outer Lanes on Fi	reeway (NO), In	0	Average Density (D), pc/mi/ln		44.2
Level of Service (LOS)		E	Density in Ramp Influence Are	a (DR), pc/mi/ln	35.9

HCS Basic Freeway Report				
Project Information				
Segment Number	3	Segment Name	I-90/SR-2 b/w SR-2 and SR-57 (2-Lane)	
Analysis Period Number	1	Segment Analysis Period	08:00-08:15	
Geometric Data				
Number of Lanes (N), In	2	Terrain Type	Level	
Segment Length (L), ft	780	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.67	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	3870	Heavy Vehicle Adjustment Factor (fHV)	0.885	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	2326	
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.97	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	55.3	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	42.1	
Total Ramp Density Adjustment	-	Level of Service (LOS)	E	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

HCS Basic Freeway Report				
Project Information				
Segment Number	4	Segment Name	I-90/SR-2 b/w SR-2 and SR-57 (3-Lane)	
Analysis Period Number	1	Segment Analysis Period	08:00-08:15	
Geometric Data				
Number of Lanes (N), In	3	Terrain Type	Level	
Segment Length (L), ft	1200	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	3870	Heavy Vehicle Adjustment Factor (fHV)	0.885	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1551	
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.65	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	67.0	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.6	
Total Ramp Density Adjustment	-	Level of Service (LOS)	С	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

Project information					
Segment Number 5		Segment Name	I-90 Exit R	amp to SR-57	
Analysis Period Number 1		Segment Analysis Period	08:00-08:1	5	
Geometric Data					
		Freeway	Ramp		
Number of Lanes (N), In		3	1		
Free-Flow Speed (FFS), mi/h		70.0	55.0		
Segment Length (L) / Deceleration Len	gth (LD), ft	1500	600		
Terrain Type		Level	Level		
Percent Grade, %		-	-		
Segment Type / Ramp Type		Freeway	Right-Side	ed One-Lane	
Adjustment Factors		·			
Driver Population		All Familiar	All Familia	r	
Weather Type		Non-Severe Weather	Non-Sever	re Weather	
Incident Type		No Incident	-		
Proportion of CAVs in Traffic Stream		0	-		
Final Speed Adjustment Factor (SAF)		1.000	1.000		
Demand Adjustment Factor (DAF)		1.000	1.000		
Capacity Adjustment Factor for CAVs, C	CAFcav	1.000	-		
Final Capacity Adjustment Factor (CAF)		1.000	1.000	1.000	
Demand and Capacity					
Demand Volume (Vi), veh/h		3870	1060		
Peak Hour Factor (PHF)		0.94	0.94	0.94	
Total Trucks, %		13.00	6.00	6.00	
Heavy Vehicle Adjustment Factor (fHV)		0.885	0.943	0.943	
Flow Rate (vi), pc/h		4652	1196		
Capacity (cmd), pc/h		7200	2200		
Initial Adjusted Capacity (cmda), pc/h		7200	-		
Final Adjusted Capacity (cmda), pc/h		7200	2200		
Volume-to-Capacity Ratio (v/c)		0.65	0.54	0.54	
Speed and Density					
Upstream Equilibrium Distance (LEQ), ft	18587.8	Flow Outer Lanes (vOA), pc/ł	h/ln	1420	
Downstream Equilibrium Distance (LEQ	), ft -	Off-Ramp Influence Area Sp	eed (SR), mi/h	62.3	
Flow in Lanes 1 and 2 (v12), pc/h	3232	Outer Lanes Freeway Speed	(SO), mi/h	75.2	
Flow Entering Ramp-Infl. Area (vR12), p	c/h -	Ramp Junction Speed (S), m	ii/h	65.7	
Number of Outer Lanes on Freeway (N	0), In 1	Average Density (D), pc/mi/	In	23.6	
Level of Service (LOS)	С	Density in Ramp Influence A	Area (DR), pc/mi/ln	26.6	

HCS Basic Freeway Report					
Project Information	Project Information				
Segment Number	6	Segment Name	I-90 below SR-57		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	3220	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.17		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors	•				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	2810	Heavy Vehicle Adjustment Factor (fHV)	0.885		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1126		
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.47		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.1		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information					
Segment Number 7		Segment Name	I-90 Entra	nce Ramp from SR-57	
Analysis Period Number 1		Segment Analysis Period	08:00-08:1	5	
Geometric Data		· · · ·			
		Freeway	Ramp		
Number of Lanes (N), In		3	1		
Free-Flow Speed (FFS), mi/h		70.0	55.0		
Segment Length (L) / Acceleration Leng	th (LA), ft	1500	730		
Terrain Type		Level	Level		
Percent Grade, %		-	-		
Segment Type / Ramp Type		Freeway	Right-Side	ed One-Lane	
Adjustment Factors					
Driver Population		All Familiar	All Familia	r	
Weather Type		Non-Severe Weather	Non-Seve	re Weather	
Incident Type		No Incident	-		
Proportion of CAVs in Traffic Stream		0	-	-	
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000	
Demand Adjustment Factor (DAF)		1.000	1.000	1.000	
Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-		
Final Capacity Adjustment Factor (CAF)		1.000	1.000	1.000	
Demand and Capacity					
Demand Volume (Vi), veh/h		2810	770	770	
Peak Hour Factor (PHF)		0.94	0.94	0.94	
Total Trucks, %		13.00	6.00	6.00	
Heavy Vehicle Adjustment Factor (fHV)		0.885	0.943	0.943	
Flow Rate (vi), pc/h		3378	869	869	
Capacity (cmd), pc/h		7200	2200	2200	
Adjusted Capacity (cmda), pc/h		7200	2200	2200	
Volume-to-Capacity Ratio (v/c)		0.59	0.40	0.40	
Speed and Density					
Upstream Equilibrium Distance (LEQ), ft	1707.6	Flow Outer Lanes (vOA), pc/h/	In	1358	
Downstream Equilibrium Distance (LEQ),	ft 3420.2	On-Ramp Influence Area Spee	ed (SR), mi/h	61.3	
Flow in Lanes 1 and 2 (v12), pc/h	2020	Outer Lanes Freeway Speed (S	50), mi/h	66.9	
Flow Entering Ramp-Infl. Area (vR12), pc	/h 2889	Ramp Junction Speed (S), mi/	h	63.0	
Number of Outer Lanes on Freeway (No	)), ln 1	Average Density (D), pc/mi/ln		22.5	
Level of Service (LOS)	С	Density in Ramp Influence Are	Density in Ramp Influence Area (DR), pc/mi/ln 23.1		

HCS Basic Freeway Report				
Project Information				
Segment Number	8	Segment Name	I-90 b/w SR-57 and SR-254	
Analysis Period Number	1	Segment Analysis Period	08:00-08:15	
Geometric Data				
Number of Lanes (N), In	3	Terrain Type	Level	
Segment Length (L), ft	7240	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	3580	Heavy Vehicle Adjustment Factor (fHV)	0.885	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1434	
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.60	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.4	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.7	
Total Ramp Density Adjustment	-	Level of Service (LOS)	С	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

Project information						
Segment Number 9	9		Segment Name	I-90 Exit R	amp to SR-254	
Analysis Period Number 1	1		Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD)	, ft	1500	510		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs	, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	NF)		1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi), veh/h			3580	580		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			13.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (fhy	V)		0.885	0.962	0.962	
Flow Rate (vi), pc/h			4303	641		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h			7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.60	0.29	0.29	
Speed and Density						
Upstream Equilibrium Distance (LEQ),	, ft	7158.6	Flow Outer Lanes (vOA), pc/h/l	n	1381	
Downstream Equilibrium Distance (Li	EQ), ft	-	Off-Ramp Influence Area Spee	ed (SR), mi/h	63.7	
Flow in Lanes 1 and 2 (v12), pc/h		2922	Outer Lanes Freeway Speed (S	50), mi/h	75.3	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/ł	n	67.0	
Number of Outer Lanes on Freeway	(No), In	1	Average Density (D), pc/mi/ln		21.4	
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 2			

HCS Basic Freeway Report				
Project Information				
Segment Number	10	Segment Name	I-90 below SR-254	
Analysis Period Number	1	Segment Analysis Period	08:00-08:15	
Geometric Data				
Number of Lanes (N), In	3	Terrain Type	Level	
Segment Length (L), ft	2330	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	3000	Heavy Vehicle Adjustment Factor (fHV)	0.885	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1202	
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.50	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.2	
Total Ramp Density Adjustment	-	Level of Service (LOS)	В	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

rioject information						
Segment Number	11		Segment Name	I-90 Entrai	nce Ramp from SR-254	
Analysis Period Number	1		Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Le	ength (LA),	ft	1500	800		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-			
Final Capacity Adjustment Factor (CA	λF)		1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi), veh/h			3000	810	810	
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			13.00	3.00	3.00	
Heavy Vehicle Adjustment Factor (fH	V)		0.885	0.971	0.971	
Flow Rate (vi), pc/h			3606	887	887	
Capacity (cmd), pc/h			7200	2200	2200	
Adjusted Capacity (cmda), pc/h			7200	2200	2200	
Volume-to-Capacity Ratio (v/c)			0.62	0.40	0.40	
Speed and Density						
Upstream Equilibrium Distance (LEQ)	, ft	1791.3	Flow Outer Lanes (vOA), pc/h/l	n	1442	
Downstream Equilibrium Distance (L	EQ), ft	3775.6	On-Ramp Influence Area Spee	d (SR), mi/h	61.2	
Flow in Lanes 1 and 2 (v12), pc/h		2164	Outer Lanes Freeway Speed (S	0), mi/h	66.6	
Flow Entering Ramp-Infl. Area (vR12),	, pc/h	3051	Ramp Junction Speed (S), mi/h	1	62.8	
Number of Outer Lanes on Freeway	(NO), In	1	Average Density (D), pc/mi/ln	Average Density (D), pc/mi/ln         23.8		
Level of Service (LOS)		С	Density in Ramp Influence Are	Density in Ramp Influence Area (DR), pc/mi/ln 23.9		

HCS Basic Freeway Report				
Project Information				
Segment Number	12	Segment Name	I-90 b/w SR-254 and SR-611	
Analysis Period Number	1	Segment Analysis Period	08:00-08:15	
Geometric Data				
Number of Lanes (N), In	3	Terrain Type	Level	
Segment Length (L), ft	11310	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	3810	Heavy Vehicle Adjustment Factor (fHV)	0.909	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1486	
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.62	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.1	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.5	
Total Ramp Density Adjustment	-	Level of Service (LOS)	С	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

Project information						
Segment Number 1	13		Segment Name	I-90 Exit R	amp to SR-611	
Analysis Period Number 1	l		Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD),	, ft	1500	510		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			• 			
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs, CAFCAV			1.000	-		
Final Capacity Adjustment Factor (CA	νF)		1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi), veh/h			3810	630		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			10.00	10.00	10.00	
Heavy Vehicle Adjustment Factor (fh)	/)		0.909	0.909	0.909	
Flow Rate (vi), pc/h			4459	737		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h			7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.62	0.34	0.34	
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft	7554.6	Flow Outer Lanes (vOA), pc/h/ln		1433	
Downstream Equilibrium Distance (Le	EQ), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	63.4	
Flow in Lanes 1 and 2 (v12), pc/h		3026	Outer Lanes Freeway Speed (SO)	), mi/h	75.1	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h		66.7	
Number of Outer Lanes on Freeway (	(No), In	1	Average Density (D), pc/mi/ln		22.3	
Level of Service (LOS)		С	Density in Ramp Influence Area	(DR), pc/mi/ln	25.7	
		-			-	

HCS Basic Freeway Report				
Project Information				
Segment Number	14	Segment Name	I-90 below SR-611 (3-lane section)	
Analysis Period Number	1	Segment Analysis Period	08:00-08:15	
Geometric Data				
Number of Lanes (N), In	3	Terrain Type	Level	
Segment Length (L), ft	2560	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	3180	Heavy Vehicle Adjustment Factor (fHV)	0.909	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1241	
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.52	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.7	
Total Ramp Density Adjustment	-	Level of Service (LOS)	В	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

roject mormation						
Segment Number	15		Segment Name	I-90 Entrar	nce Ramp from SR-611	
Analysis Period Number	1		Segment Analysis Period	08:00-08:1	5	
Geometric Data			• •			
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration L	ft	1500	640			
Terrain Type		Level	Level			
Percent Grade, %		-	-			
Segment Type / Ramp Type		Freeway	Right-Side	d One-Lane		
Adjustment Factors			•			
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)	)		1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAV	s, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			3180	1390		
Peak Hour Factor (PHF)			0.94	0.94 0.94		
Total Trucks, %			10.00	6.00		
Heavy Vehicle Adjustment Factor (fH	IV)		0.909	0.943		
Flow Rate (vi), pc/h			3722	1568		
Capacity (cmd), pc/h			7200	2200		
Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.73	0.71		
Speed and Density						
Upstream Equilibrium Distance (LEQ)	), ft	1890.8	Flow Outer Lanes (vOA), pc/h/lr	1	1507	
Downstream Equilibrium Distance (LEQ), ft -		-	On-Ramp Influence Area Speed	d (SR), mi/h	58.2	
Flow in Lanes 1 and 2 (v12), pc/h 2215			Outer Lanes Freeway Speed (So	66.4		
Flow Entering Ramp-Infl. Area (vR12), pc/h 3783			Ramp Junction Speed (S), mi/h   60.3			
Number of Outer Lanes on Freeway (NO), In 1			Average Density (D), pc/mi/ln     29.2			
Level of Service (LOS) D			Density in Ramp Influence Area (DR), pc/mi/ln 30.3			

HCS Basic Freeway Report									
Project Information									
Segment Number	16	Segment Name	I-90 east of SR-611						
Analysis Period Number	1	Segment Analysis Period	08:00-08:15						
Geometric Data									
Number of Lanes (N), In	3	Terrain Type	Level						
Segment Length (L), ft	3230	Percent Grade, %	-						
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-						
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33						
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0						
Right-Side Lateral Clearance, ft	-								
Adjustment Factors			1						
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000						
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000						
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000						
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000						
Demand and Capacity									
Demand Volume (V), veh/h	4570	Heavy Vehicle Adjustment Factor (fHV)	0.901						
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1799						
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400						
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (Cadj), pc/h/ln	2400						
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400						
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.75						
Speed and Density									
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	65.8						
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	27.3						
Total Ramp Density Adjustment	-	Level of Service (LOS)	D						
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0								

Copyright © 2023 University of Florida. All Rights Reserved.

HCSTM Freeways Version 2023 I-90 EB 2045 AM - OPTION 2 AND 3 TSMO.xuf

Generated: 08/24/2023 15:05:33

### HCS Freeway Facilities Report

### **Project Information**

Analyst	GSH	Date	2/17/23
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Facility Name	I-90 EB OPTIONS 2 AND 3	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

#### Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	16
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	9.01		

#### Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SR-2 West of I-90/SR-2 Merge	5200	2
2	Merge	Merge	Merge I-90 at SR-2 Merge		2
3	Basic	Basic	I-90/SR-2 b/w SR-2 and SR-57 (2-Lane)	780	2
4	Basic	Basic	I-90/SR-2 b/w SR-2 and SR-57 (3-Lane)	1200	3
5	Diverge	Diverge	I-90 Exit Ramp to SR-57	1500	3
6	Basic	Basic	I-90 below SR-57	3220	3
7	Merge	Merge	I-90 Entrance Ramp from SR-57	1500	3
8	Basic	Basic	I-90 b/w SR-57 and SR-254	7240	3
9	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	3
10	Basic	Basic	I-90 below SR-254	2330	3
11	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	3
12	Basic	Basic	I-90 b/w SR-254 and SR-611	11310	3
13	Diverge	Diverge	I-90 Exit Ramp to SR-611	1500	3
14	Basic	Basic	I-90 below SR-611 (3-lane section)	2560	3
15	Merge	Merge	I-90 Entrance Ramp from SR-611	1500	3
16	Basic Basic I-		I-90 east of SR-611	3230	3

#### Facility Segment Data

	Segment 1: Basic														
АР	PI	HF	fŀ	IV	Flow (pc/		Capa (pc,			/c tio		eed i/h)		nsity ni/ln)	LOS
1 0.94 0.943 3226 4800 0.67 68.0 23.7 C															
							Segmer	nt 2: Me	rge						
AP         PHF         fHV         Flow Rate (pc/h)         Capacity (pc/h)         d/c							eed i/h)		nsity ni/ln)	LOS					
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	

1	0.94	0.94	0.943	0.775	4159	933	4800	2200	0.87	0.42	56.6	56.6	36.7	32.4	D
								nt 3: Ba							
АР	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/	city	d, Ra			eed i/h)	Den (pc/n	isity ni/ln)	LOS
1	0.9	94	1.0	000	370		480		0.	78	-	1.6	29	-	D
							Segme	nt 4: Ba	asic						
АР	Pł	łF	fŀ	łV	Flow (pc,		Capacity (pc/h)		d/c Ratio			eed i/h)	Density (pc/mi/ln)		LOS
1	0.9	94	0.8	85	42	55	720	00	0.!	59	68	3.9	20	).4	С
Segment 5: Diverge															
АР	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)	Den (pc/n	isity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.943	4255	1207	7200	2200	0.59	0.55	65.2	62.2	21.8	26.6	С
Segment 6: Basic															
AP	Pł	HF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)	Den (pc/n	sity ni/ln)	LOS
1	0.9	94	0.8	85	290	59	720	00	0.4	41	69	9.9	14	l.1	В
Segment 7: Merge															
ΑΡ	Pł	łF	f⊦	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)	Den (pc/n	isity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.943	3849	880	7200	2200	0.53	0.40	63.4	61.7	20.2	21.3	C
							Segme	nt 8: Ba	asic						
AP	Pł		fŀ		Flow (pc,	/h)	Capacityd/cSpeedDens(pc/h)Ratio(mi/h)(pc/mi		ni/ĺn)	LOS					
1	0.9	94	0.8	885	390		720		0.5	54	69	9.9	18.6		С
							Segmen								
AP	Pł	HF	fF	IV	Flow (pc,		Capa (pc/		d, Ra			Speed Density (mi/h) (pc/mi/ln)			LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.962	3907	697	7200	2200	0.54	0.32	66.9	63.5	19.5	23.0	С
							Segmer	nt 10: B	asic						
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)	Den (pc/n	isity ni/ln)	LOS
1	0.9	94	0.8	85	314	49	720	00	0.4	44	69	9.9	15	5.0	В
							Segmen	t 11: M	erge						
AP	Pł	4F	fŀ	iv	Flow (pc/		Capa (pc/		d, Ra			eed i/h)		sity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.971	3993	844	7200	2200	0.55	0.38	63.4	61.8	21.0	21.5	C
							Segmer								
AP	Pł	HF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)	Den (pc/n	sity ni/ln)	LOS

1	0.	94	0.9	909	39	67	720	00	0.	55	69	9.8		18.9	С		
						:	Segment	13: Di	verge								
АР	PI	HF	fł	IV	Flow (pc,		Capa (pc/			d/c Ratio						ensity :/mi/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.			
1	0.94	0.94	0.909	0.909	3967	609	7200	2200	0.55	0.28	67.1	63.8	.8 19.7		C		
Segment 14: Basic																	
AP	PI	HF	fł	łV	Flow (pc,		Capa (pc/			/c tio		eed i/h)		ensity :/mi/ln)	LOS		
1	0.	94	0.9	909	33	59	720	00	0.	47	69	9.9		16.0	В		
Segment 15: Merge																	
AP	PI	HF	fł	łV	Flow (pc,		Capa (pc/			/c tio		eed i/h)		ensity :/mi/ln)	LOS		
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.			
1	0.94	0.94	0.909	0.943	4577	1218	7200	2200	0.64	0.55	62.1	60.3	24.6	26.1	С		
							Segmer	nt 16: E	asic								
АР	PI	HF	fł	łV	Flow (pc,		Capa (pc/			/c tio	Speed (mi/h)			ensity :/mi/ln)	LOS		
1	0.	94	0.9	901	46	64	720	00	0.	65	68	3.5	22.7				
Faci	lity Aı	nalysi	s Res	ults													
AP	VM1 veh-mi			Deman -mi/AP		HD -h/AP	Total Delay \$/AP	Cost	Speed mi/h		Density pc/mi/ln	Den veh/	sity mi/ln	TT min	LOS		
1	777	5	7	7075	3	.67	91.82		67.8		19.8	17	7.9	8.00	С		
Faci	lity O	verall	Resu	lts									`				
Space	e Mean S	Speed, r	ni/h		67.8			Averag	je Densi	ty, veh,	/mi/ln	17.	9				
Avera	ge Trave	el Time,	min		8.00			Averag	je Densi	ty, pc/r	ni/ln	19.	8				
Total	VMT, ve	h-mi			7775			Total V	HD, veh	ı-h		3.6	7				
Vehic	le Value	of Time	e (VOT),	\$/h	25.00			Total D	elay Co	st, \$		91.	82				
Copyright © 2023 University of Florida. All Rights Reserved. HCS TW Freeways Version 2023 Generated: 08/24/2023 15:07:53																	

Copyright © 2023 University of Florida. All Rights Reserved.

HCSTM Freeways Version 2023 I-90 EB 2045 PM - OPTION 2 AND 3 TSMO.xuf Generated: 08/24/2023 15:07:53

						LOS						
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	С	D	D	С	С	В	С	С	С	В	С	С
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	С	В	С	С								
					Sp	peed (mi/	′h)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	68.0	56.6	64.6	68.9	65.2	69.9	63.4	69.9	66.9	69.9	63.4	69.8
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	67.1	69.9	62.1	68.5								
					Dens	sity (pc/n	ni/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	23.7	36.7	29.1	20.4	21.8	14.1	20.2	18.6	19.5	15.0	21.0	18.9
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	19.7	16.0	24.6	22.7								
				D	emand -	Capacity	Ratio (D/	<b>′C</b> )				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.67	0.87	0.78	0.59	0.59	0.41	0.53	0.54	0.54	0.44	0.55	0.55
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	0.55	0.47	0.64	0.65								
					Dens	ity (veh/ı	mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	22.3	34.6	29.1	18.1	19.3	12.5	17.9	16.5	17.3	13.3	18.6	17.2
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	17.9	14.5	22.4	20.5								
				Density	in Ramp	Influenc	e Area (p	c/mi/ln)				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	-	32.4	-	-	26.6	-	21.3	-	23.0	-	21.5	-
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	23.2	-	26.1	-								
					Dens	sity-Base	dLOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	С	D	D	С	С	В	С	С	С	В	C	С
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	С	В	С	С								
					Dema	and-Base	d LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	-	-	-	-	-	-	-	-	-	-	-	-
	Seg 13	Seg 14	Seg 15	Seg 16								

AP 1	-	-	-	-								
	Volume - Capacity Ratio (V/C)											
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.67	0.87	0.78	0.59	0.59	0.41	0.53	0.54	0.54	0.44	0.55	0.55
	Seg 13	Seg 14	Seg 15	Seg 16								
AP 1	0.55	0.47	0.64	0.65								

# HCS Basic Freeway Report

Project Information				
Analyst	GSH	Date	2/17/23	
Agency	CMT	Analysis Year	2045	
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV	
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary	
Segment Number	1	Segment Name	SR-2 West of I-90/SR-2 Merge	
Analysis Period Number	1	Segment Analysis Period	16:00-16:15	
Geometric Data				
Number of Lanes (N), In	2	Terrain Type	Level	
Segment Length (L), ft	5200	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	2860	Heavy Vehicle Adjustment Factor (fHV)	0.943	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1613	
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.67	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.0	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	23.7	
Total Ramp Density Adjustment	-	Level of Service (LOS)	с	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

Project Information						
Segment Number	2		Segment Name	I-90 at SR-	2 Merge	
Analysis Period Number	1		Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Accelera	ation Length (LA)	, ft	1500	830		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic S	Stream		0	-		
Final Speed Adjustment Facto	r (SAF)		1.000	1.000		
Demand Adjustment Factor (I	DAF)		1.000	1.000		
Capacity Adjustment Factor for	or CAVs, CAFCAV		1.000	-		
Final Capacity Adjustment Fac	tor (CAF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2860	680		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			6.00	29.00		
Heavy Vehicle Adjustment Fac	tor (fHV)		0.943	0.775		
Flow Rate (vi), pc/h			3226	933		
Capacity (cmd), pc/h			4800	2200		
Adjusted Capacity (cmda), pc/	า		4800	2200		
Volume-to-Capacity Ratio (v/o	<u>ב)</u>		0.87	0.42		
Speed and Density						
Upstream Equilibrium Distance (LEQ), ft -			Flow Outer Lanes (vOA), pc/h/ln	I	-	
Downstream Equilibrium Distance (LEQ), ft -			On-Ramp Influence Area Speec	l (SR), mi/h	56.6	
Flow in Lanes 1 and 2 (v12), pc/h 3226			Outer Lanes Freeway Speed (Sc	70.0		
Flow Entering Ramp-Infl. Area (vR12), pc/h     4159     R			Ramp Junction Speed (S), mi/h 56.6			
Number of Outer Lanes on Freeway (NO), In 0			Average Density (D), pc/mi/ln		36.7	
Level of Service (LOS) D			Density in Ramp Influence Area (DR), pc/mi/ln 32.4			

HCS Basic Freeway Report Project Information								
								Segment Number
Analysis Period Number	1	Segment Analysis Period	16:00-16:15					
Geometric Data								
Number of Lanes (N), In	2	Terrain Type	Level					
Segment Length (L), ft	780	Percent Grade, %	-					
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-					
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.67					
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0					
Right-Side Lateral Clearance, ft	-							
Adjustment Factors								
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000					
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000					
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000					
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000					
Demand and Capacity								
Demand Volume (V), veh/h	3540	Heavy Vehicle Adjustment Factor (fHV)	1.000					
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1883					
Total Trucks, %	0.00	Capacity (c), pc/h/ln	2400					
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400					
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400					
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.78					
Speed and Density								
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	64.6					
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	29.1					
Total Ramp Density Adjustment	-	Level of Service (LOS)	D					
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0							

HCS Basic Freeway Report Project Information								
								Segment Number
Analysis Period Number	1	Segment Analysis Period	16:00-16:15					
Geometric Data								
Number of Lanes (N), In	3	Terrain Type	Level					
Segment Length (L), ft	1200	Percent Grade, %	-					
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-					
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00					
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0					
Right-Side Lateral Clearance, ft	-							
Adjustment Factors								
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000					
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000					
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000					
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000					
Demand and Capacity								
Demand Volume (V), veh/h	3540	Heavy Vehicle Adjustment Factor (fHV)	0.885					
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1418					
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400					
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400					
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400					
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.59					
Speed and Density								
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.9					
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.4					
Total Ramp Density Adjustment	-	Level of Service (LOS)	С					
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0							

Project information						
Segment Number 5			Segment Name	I-90 Exit R	amp to SR-57	
Analysis Period Number 1			Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp	Ramp	
Number of Lanes (N), In			3	1	1	
Free-Flow Speed (FFS), mi/h			70.0	55.0	55.0	
Segment Length (L) / Deceleration Length (LD), ft			1500	600	600	
Terrain Type			Level	Level	Level	
Percent Grade, %			-	-	-	
Segment Type / Ramp Type		Freeway	Right-Side	Right-Sided One-Lane		
Adjustment Factors						
Driver Population		All Familiar	All Familia	All Familiar		
Weather Type		Non-Severe Weather	Non-Sever	Non-Severe Weather		
Incident Type			No Incident	-	-	
Proportion of CAVs in Traffic Stream		0	-	-		
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Capacity Adjustment Factor for CAVs, CAFcav			1.000	-	-	
Final Capacity Adjustment Factor (CAF)			1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi), veh/h			3540	1070	1070	
Peak Hour Factor (PHF)		0.94	0.94	0.94		
Total Trucks, %			13.00	6.00	6.00	
Heavy Vehicle Adjustment Factor (fHV)		0.885	0.943	0.943		
Flow Rate (vi), pc/h		4255	1207	1207		
Capacity (cmd), pc/h		7200	2200	2200		
Initial Adjusted Capacity (cmda), pc/h		7200	-	-		
Final Adjusted Capacity (cmda), pc/h		7200	2200	2200		
Volume-to-Capacity Ratio (v/c)		0.59	0.55	0.55		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft	12096.0	Flow Outer Lanes (vOA), pc/h/ln		1024	
Downstream Equilibrium Distance (LE	Q), ft	-	Off-Ramp Influence Area Speed (SR), mi/h		62.2	
Flow in Lanes 1 and 2 (v12), pc/h		3231	Outer Lanes Freeway Speed (SO), mi/h		76.7	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h		65.2	
Number of Outer Lanes on Freeway (NO), In 1		Average Density (D), pc/mi/ln		21.8		
evel of Service (LOS) C		Density in Ramp Influence Area (DR), pc/mi/ln 26.6				

	HCS Basic Fi	eeway Report	
Project Information			
Segment Number	6	Segment Name	I-90 below SR-57
Analysis Period Number	1	Segment Analysis Period	16:00-16:15
Geometric Data			
Number of Lanes (N), In	3	Terrain Type	Level
Segment Length (L), ft	3220	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	2470	Heavy Vehicle Adjustment Factor (fHV)	0.885
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	990
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.41
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	14.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

Project information						
Segment Number 7		Segment Name	I-90 Entra	nce Ramp from SR-57		
Analysis Period Number 1		Segment Analysis Period	16:00-16:1	15		
Geometric Data						
		Freeway	Ramp			
Number of Lanes (N), In		3	1			
Free-Flow Speed (FFS), mi/h		70.0	55.0			
Segment Length (L) / Acceleration Leng	th (LA), ft	1500	730			
Terrain Type		Level	Level			
Percent Grade, %		-	-			
Segment Type / Ramp Type		Freeway	Right-Side	ed One-Lane		
Adjustment Factors						
Driver Population		All Familiar	All Familia	r		
Weather Type		Non-Severe Weather	Non-Seve	re Weather		
Incident Type		No Incident	-			
Proportion of CAVs in Traffic Stream		0	-	-		
Final Speed Adjustment Factor (SAF)		1.000	1.000			
Demand Adjustment Factor (DAF)		1.000	1.000			
Capacity Adjustment Factor for CAVs, C	AFCAV	1.000	-			
Final Capacity Adjustment Factor (CAF)		1.000	1.000			
Demand and Capacity						
Demand Volume (Vi), veh/h		2470	780			
Peak Hour Factor (PHF)		0.94	0.94	0.94		
Total Trucks, %		13.00	6.00	6.00		
Heavy Vehicle Adjustment Factor (fHV)		0.885	0.943			
Flow Rate (vi), pc/h		2969	880			
Capacity (cmd), pc/h		7200	2200			
Adjusted Capacity (cmda), pc/h		7200	2200			
Volume-to-Capacity Ratio (v/c)		0.53	0.53 0.40			
Speed and Density						
Upstream Equilibrium Distance (LEQ), ft	1622.4	Flow Outer Lanes (vOA), pc/h/	Ίn	1194		
Downstream Equilibrium Distance (LEQ),	, ft 3713.2	On-Ramp Influence Area Spe	ed (SR), mi/h	61.7		
Flow in Lanes 1 and 2 (v12), pc/h	1775	Outer Lanes Freeway Speed (	SO), mi/h	67.5		
Flow Entering Ramp-Infl. Area (vR12), pc	/h 2655	Ramp Junction Speed (S), mi/	ĥ	63.4		
Number of Outer Lanes on Freeway (NC	)), ln 1	Average Density (D), pc/mi/ln		20.2		
Level of Service (LOS)	С	Density in Ramp Influence Are	ea (DR), pc/mi/ln	21.3		

	HCS Basic Fr	eeway Report		
Project Information				
Segment Number	8	8 Segment Name		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15	
Geometric Data				
Number of Lanes (N), In	3	Terrain Type	Level	
Segment Length (L), ft	7240	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	3250	Heavy Vehicle Adjustment Factor (fHV)	0.885	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1302	
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.54	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.6	
Total Ramp Density Adjustment	-	Level of Service (LOS)	С	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

Project information						
Segment Number	9		Segment Name	I-90 Exit R	amp to SR-254	
Analysis Period Number	1		Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration L	.ength (LD)	, ft	1500	510		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF	)		1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAV	s, CAFcav		1.000	-		
Final Capacity Adjustment Factor (C	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			3250	630		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			13.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (f	IV)		0.885	0.962		
Flow Rate (vi), pc/h			3907	697		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/l	า		7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.54	0.32		
Speed and Density						
Upstream Equilibrium Distance (LEQ	), ft	8156.5	Flow Outer Lanes (vOA), pc/h/lr	1	1188	
Downstream Equilibrium Distance (I	_EQ), ft	-	Off-Ramp Influence Area Speed	d (SR), mi/h	63.5	
Flow in Lanes 1 and 2 (v12), pc/h		2719	Outer Lanes Freeway Speed (So	), mi/h	76.1	
Flow Entering Ramp-Infl. Area (vR12)	), pc/h	-	Ramp Junction Speed (S), mi/h		66.9	
		iber of Outer Lanes on Freeway (NO), In 1		Average Density (D), pc/mi/ln 19.		
Number of Outer Lanes on Freeway	(No), In	1	Average Density (D), pc/mi/ln		19.5	

HCS Basic Freeway Report					
Project Information					
Segment Number	10	Segment Name	I-90 below SR-254		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	2330	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	2620	Heavy Vehicle Adjustment Factor (fHV)	0.885		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1050		
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.44		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.0		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information						
Segment Number 1	11		Segment Name	I-90 Entrar	nce Ramp from SR-254	
Analysis Period Number 1	1		Segment Analysis Period	16:00-16:1	5	
Geometric Data			·			
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Le	ength (LA),	ft	1500	800		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs	, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	NF)		1.000	1.000		
Demand and Capacity			•			
Demand Volume (Vi), veh/h			2620	770		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			13.00	3.00	3.00	
Heavy Vehicle Adjustment Factor (fhy	v)		0.885	0.971		
Flow Rate (vi), pc/h			3149	844		
Capacity (cmd), pc/h			7200	2200		
Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.55	0.55 0.38		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	, ft	1684.3	Flow Outer Lanes (vOA), pc/h/In	1	1260	
Downstream Equilibrium Distance (LI	EQ), ft	3119.9	On-Ramp Influence Area Speed	d (SR), mi/h	61.8	
Flow in Lanes 1 and 2 (v12), pc/h		1889	Outer Lanes Freeway Speed (Sc	), mi/h	67.3	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	2733	Ramp Junction Speed (S), mi/h		63.4	
Number of Outer Lanes on Freeway	(No), In	1	Average Density (D), pc/mi/ln		21.0	
Level of Service (LOS)		с	Density in Ramp Influence Area (DR), pc/mi/ln 21.5			

	HCS Basic Fr	eeway Report		
Project Information				
Segment Number	12	12 Segment Name		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15	
Geometric Data				
Number of Lanes (N), In	3	Terrain Type	Level	
Segment Length (L), ft	11310	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	3390	Heavy Vehicle Adjustment Factor (fHV)	0.909	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1322	
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.55	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.8	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.9	
Total Ramp Density Adjustment	-	Level of Service (LOS)	С	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

Project information							
Segment Number 1	3		Segment Name	I-90 Exit R	amp to SR-611		
Analysis Period Number 1			Segment Analysis Period	16:00-16:1	5		
Geometric Data							
			Freeway	Ramp			
Number of Lanes (N), In			3	1			
Free-Flow Speed (FFS), mi/h			70.0	55.0			
Segment Length (L) / Deceleration Le	ength (LD),	ft	1500	510			
Terrain Type			Level	Level			
Percent Grade, %			-	-			
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane		
Adjustment Factors							
Driver Population			All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	re Weather		
Incident Type			No Incident	-			
Proportion of CAVs in Traffic Stream			0	-			
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000			
Capacity Adjustment Factor for CAVs,	CAFcav		1.000	-			
Final Capacity Adjustment Factor (CA	F)		1.000	1.000			
Demand and Capacity							
Demand Volume (Vi), veh/h			3390	520			
Peak Hour Factor (PHF)			0.94	0.94			
Total Trucks, %			10.00	10.00	10.00		
Heavy Vehicle Adjustment Factor (fHV	/)		0.909	0.909			
Flow Rate (vi), pc/h			3967	609			
Capacity (cmd), pc/h			7200	2200			
Initial Adjusted Capacity (cmda), pc/h			7200	-			
Final Adjusted Capacity (cmda), pc/h			7200	2200			
Volume-to-Capacity Ratio (v/c)			0.55	5 0.28			
Speed and Density							
Upstream Equilibrium Distance (LEQ),	ft	7278.6	Flow Outer Lanes (vOA), pc/h/ln		1232		
Downstream Equilibrium Distance (LE	Q), ft	-	Off-Ramp Influence Area Speed	l (SR), mi/h	63.8		
Flow in Lanes 1 and 2 (v12), pc/h		2735	Outer Lanes Freeway Speed (SC	), mi/h	75.9		
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h		67.1		
Number of Outer Lanes on Freeway (	No), In	1	Average Density (D), pc/mi/ln		19.7		
Level of Service (LOS)		С	Density in Ramp Influence Area	(DR), pc/mi/ln	23.2		
		-	•		•		

	HCS Basic Fr	eeway Report		
Project Information				
Segment Number	14	Segment Name	I-90 below SR-611 (3-lane section)	
Analysis Period Number	1	Segment Analysis Period	16:00-16:15	
Geometric Data				
Number of Lanes (N), In	3	Terrain Type	Level	
Segment Length (L), ft	2560	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	2870	Heavy Vehicle Adjustment Factor (fHV)	0.909	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1120	
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.47	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.0	
Total Ramp Density Adjustment	-	Level of Service (LOS)	В	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

rioject mormation							
Segment Number 1	5		Segment Name	I-90 Entra	nce Ramp from SR-611		
Analysis Period Number 1			Segment Analysis Period	16:00-16:	15		
Geometric Data							
			Freeway	Ramp			
Number of Lanes (N), In			3	1			
Free-Flow Speed (FFS), mi/h			70.0	55.0			
Segment Length (L) / Acceleration Le	ngth (LA),	, ft	1500	640			
Terrain Type			Level	Level			
Percent Grade, %			-	-			
Segment Type / Ramp Type			Freeway	Right-Side	ed One-Lane		
Adjustment Factors							
Driver Population			All Familiar	All Familia	ır		
Weather Type			Non-Severe Weather	Non-Seve	re Weather		
Incident Type			No Incident	-			
Proportion of CAVs in Traffic Stream			0	-	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000			
Capacity Adjustment Factor for CAVs,	, CAFcav		1.000	-			
Final Capacity Adjustment Factor (CA	.F)		1.000	1.000			
Demand and Capacity							
Demand Volume (Vi), veh/h			2870	1080			
Peak Hour Factor (PHF)			0.94	0.94	0.94		
Total Trucks, %			10.00	6.00	6.00		
Heavy Vehicle Adjustment Factor (fHV	/)		0.909	0.943	0.943		
Flow Rate (vi), pc/h			3359	1218	1218		
Capacity (cmd), pc/h			7200	2200	2200		
Adjusted Capacity (cmda), pc/h			7200	2200			
Volume-to-Capacity Ratio (v/c)			0.64	0.55			
Speed and Density							
Upstream Equilibrium Distance (LEQ),	ft	1738.2	Flow Outer Lanes (vOA), pc/h/l	n	1360		
Downstream Equilibrium Distance (Le	Q), ft	-	On-Ramp Influence Area Spee	ed (SR), mi/h	60.3		
Flow in Lanes 1 and 2 (v12), pc/h		1999	Outer Lanes Freeway Speed (S	50), mi/h	66.9		
Flow Entering Ramp-Infl. Area (vR12),	pc/h	3217	Ramp Junction Speed (S), mi/h	1	62.1		
Number of Outer Lanes on Freeway (	No), In	1	Average Density (D), pc/mi/ln		24.6		
Level of Service (LOS)		С	Density in Ramp Influence Are	a (DR), pc/mi/ln	26.1		

	HCS Basic F	reeway Report	
Project Information			
Segment Number	16	Segment Name	I-90 east of SR-611
Analysis Period Number	1	Segment Analysis Period	16:00-16:15
Geometric Data			
Number of Lanes (N), In	3	Terrain Type	Level
Segment Length (L), ft	3230	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors		·	÷
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	3950	Heavy Vehicle Adjustment Factor (fHV)	0.901
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1555
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.65
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

HCS T Freeways Version 2023 I-90 EB 2045 PM - OPTION 2 AND 3 TSMO.xuf Generated: 08/24/2023 15:08:15

# EASTBOUND I-90 / SR-2 ALTERNATE BUILD CONFIGURATION

### HCS Freeway Facilities Report

#### Dr oiact Information

Proje	ct Inform	ation										
Analyst			GSH	GSH			Date			2/17/23		
Agency	,		CMT	Analysis Year			2045					
Jurisdic	tion		ODOT District 3		Time A	nalyzed		AM DH	łV			
Facility	Name		I-90 EB BUILD C AND 3	PTIONS 2	Units			U.S. Cu	istomary			
Project	Description		PID 107714 LOF	R-90-10.76								
Facili	ty Global	Input										
Jam De	nsity, pc/mi/lı	n	190.0		Density	at Capacity, po	:/mi/ln	45.0				
Queue	Discharge Ca	pacity Drop, %	7		Total Se	egments		13				
Total Ar	nalysis Period	S	1		Analysi	s Period Duratio	on, min	15				
Facility	Length, mi		9.01									
Facili	ty Segme	nt Data										
No.	Cod	ed	Analyzed		Name		Length	, ft	Lanes			
1	Bas	ic	Basic	SR-2 West	of I-90/	SR-2 Merge	4700	)	2			
2	Weav	ving	Weaving	I-90 b/\	w SR-2 a	nd SR-57	5980	5980				
3	Bas	ic	Basic	I-90	below SR-57		2720	2720				
4	Mer	ge	Merge	I-90 Entrance Ramp from SR-57			1500	1500				
5	Bas	ic	Basic	I-90 b/w SR-57 and SR-254			7240	7240				
6	Dive	rge	Diverge	I-90 Exit Ramp to SR-254		1500	1500					
7	Bas	ic	Basic	I-90 below SR-254		2330	2330					
8	Mer	ge	Merge		ance Ramp from SR-254		1500		3			
9	Bas	-	Basic		SR-254 and SR-611			11310				
10	Dive	5	Diverge		· ·	o SR-611	1500		3			
11	Bas		Basic			-lane section)		2560				
12	Mer	-	Merge		· ·	from SR-611		1500				
13	Bas	ic	Basic	I-90	east of S	R-611	3230	)	3			
Facili	ty Segme	nt Data										
				Segmen	t 1: Ba	sic						
АР	PHF	fHV	Flow Rate (pc/h)	Capaci (pc/h		d/c Ratio	Speed (mi/h)		Density (pc/mi/ln)	LOS		
1	0.94	0.943	3035	4800	)	0.63	68.8		22.1	C		
				Segment	2: Wea	nving						
АР	PHF	fHV	Flow Rate (pc/h)	Capaci (pc/h		d/c Ratio	Speed (mi/h)		Density (pc/mi/ln)	LOS		
1	0.94	0.943	4435	4580		0.97	52.5		28.2	D		
				Segmen	t 3: Ba	isic						
АР	PHF	fHV	Flow Rate (pc/h)	Capaci (pc/h		d/c Ratio	Speed (mi/h)		Density (pc/mi/ln)	LOS		

1	0.9	94	0.8	85	33	78	720	00	0.4	47	7(	0.0	10	5.1	В
							Segmer	nt 4: Me	erge						
АР	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity mi/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.943	4247	869	7200	2200	0.59	0.39	63.0	61.3	22.5	23.1	С
							Segme	nt 5: Ba	asic						
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity mi/ln)	LOS
1	0.9	94	0.8	85	430	03	720	00	0.	60	69	9.4	20	0.7	C
							Segmen	gment 6: Diverge							
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.962	4303	641	7200	2200	0.60	0.29	67.0	63.7	21.4	24.8	С
							Segme	nt 7: Ba	asic						
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.8	85	36	06	720	00	0.	50	69	9.9	1	7.2	В
							Segmer	nt 8: Me	erge						
АР	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)	Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.971	4493	887	7200	2200	0.62	0.40	62.8	61.2	23.8	23.9	С
							Segme	nt 9: Ba	isic						
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	09	44	59	720	00	0.	62	69	9.1	2	1.5	С
						9	Segment	10: Div	/erge						
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.909	0.909	4459	737	7200	2200	0.62	0.34	66.7	63.4	22.3	25.7	C
							Segmer	nt 11: B	asic						
AP	Pł	łF	f⊦	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	09	372	22	720	00	0.	52	69	9.9	1	7.7	В
							Segmen	t 12: M	erge						
АР	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.909	0.943	5290	1568	7200	2200	0.73	0.71	60.3	58.2	29.2	30.3	D

AP	PHF	fHV	Flow Rate (pc/h)	Capacit (pc/h)			Spee (mi/ł		Density (pc/mi/ln)		LOS	
1	0.94	0.94 0.901 5396 7200 0.75 65.8								27.3	D	
Fac	Facility Analysis Results											
									Density TT reh/mi/ln min		LOS	
1	8618	7568	9.02	225.54		65.2	22.3	20.1	1	8.30	С	
Fac	ility Overal	l Results										
Spac	e Mean Speed,	mi/h	65.2		Averag	e Density, ve	eh/mi/ln	20.1				
Average Travel Time, min 8.30						Average Density, pc/mi/ln 22.3						
Total VMT, veh-mi 8618						Total VHD, veh-h						
Vehicle Value of Time (VOT), \$/h         25.00         Total Delay Cost, \$         225.54												

HCSTM Freeways Version 2023 I-90 EB 2045 AM - OPTION 2 AND 3.xuf Generated: 08/24/2023 15:06:35

Seq1Seq2Seq3Seq3Seq4Seq5Seq6Seq7Seq8Seq9Seq10Seq11Seq12AP1CDBCCCBCCCBDSeq13Seq2Seq3Seq3Seq4Seq5Seq6Seq7Seg8Seq9Seg10Seg11Seg12AP16803Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP16803Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP16803Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1221Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1221Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1223Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1CSeg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1CSeg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1CSeg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11 </th <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>LOS</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>							LOS							
Seg 13Seg 13Seg 1Seg 1Seg 1Seg 13Seg 3Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 13Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 13Seg 13Seg 13Seg 14Seg 12Seg 13Seg 13Seg 12Seg 14Seg 13Seg 13Seg 12Seg 14Seg 14Seg 12Seg 14Seg 14Seg 12Seg 14Seg 14Seg 14Seg 12Seg 14Seg 14Seg 12Seg 14Seg 14 <th></th> <td>Seg 1</td> <td>Seg 2</td> <td>Seg 3</td> <td>Seg 4</td> <td>Seg 5</td> <td>Seg 6</td> <td>Seg 7</td> <td>Seg 8</td> <td>Seg 9</td> <td>Seg 10</td> <td>Seg 11</td> <td>Seg 12</td>		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12	
AP10Seg1Seg 3Seg 4Seg 6Seg 7Seg 8Seg 10Seg 11Seg 12AP1Colspan="1">Colspan="1">Colspan="1"Colspan="1"Seg 1Seg 1Seg 10Seg 11Seg 10Seg 1Seg 1Seg 10Seg 11Seg 12AP1Seg 10Seg 13Seg 10Seg 11Seg 10Seg 10 <td colsp<="" th=""><th>AP 1</th><th>С</th><th>D</th><th>В</th><th>С</th><th>С</th><th>С</th><th>В</th><th>С</th><th>С</th><th>С</th><th>В</th><th>D</th></td>	<th>AP 1</th> <th>С</th> <th>D</th> <th>В</th> <th>С</th> <th>С</th> <th>С</th> <th>В</th> <th>С</th> <th>С</th> <th>С</th> <th>В</th> <th>D</th>	AP 1	С	D	В	С	С	С	В	С	С	С	В	D
Seg1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12           AP 1         Seg 13         Seg 1         Seg 11		Seg 13												
Seq1         Seq2         Seq3         Seq4         Seq5         Seq6         Seq7         Seq8         Seq9         Seq10         Seq11         Seq12           AP1         628         52.5         700         62.0         62	AP 1	D												
AP 166.852.570.0060.0060.0060.7060.9060.2060.1060.7060.30Seg 13AP 165.8Seg 13AP 122.1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 122.122.016.122.520.721.417.223.821.52.317.729.2Seg 13Seg 13Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 127.327.3Seg 10Seg 11Seg 12Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 10.030.070.470.500.600.600.500.620.620.620.520.73Seg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 10.5534.219.918.318.915.221.119.520.316.126.5Seg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 12.6Seg 13Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 12.6Seg 13Seg 4Seg 5Seg 6Seg 7<						S	peed (mi	/h)						
Seg 13 AP 1Seg 13 Seg 2Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 122.128.216.122.520.721.417.223.821.522.317.729.2Seg 13 AP 127.327.527.417.223.821.522.317.729.2Seg 13 AP 127.327.527.527.627.827.527.527.729.2AP 10.630.970.470.990.000.000.620.620.620.91Seg 12AP 10.630.970.470.990.000.000.620.620.620.920.930.930.91AP 10.630.970.470.990.000.000.000.620.620.620.920.930.91Seg 12AP 10.630.970.470.990.000.000.000.620.620.620.920.91Seg 12AP 10.630.970.470.990.000.000.620.620.620.920.91Seg 13AP 10.75555Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 12.0014.219.918.318.915.221.119.520.316.120.5AP 12.01Seg 1Seg 1Seg 6S		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12	
AP 1       edd         Vertice v	AP 1	68.8	52.5	70.0	63.0	69.4	67.0	69.9	62.8	69.1	66.7	69.9	60.3	
Density (pc/mi/ln)Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 12.212.821612.252.072.1417.22.382.152.2317.72.22AP 12.732.732.732.1417.22.382.152.2317.72.22AP 12.732.732.7417.22.88Seg 9Seg 10Seg 11Seg 12AP 12.63Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 10.630.970.470.990.600.600.600.62 </th <th></th> <th>Seg 13</th> <th></th>		Seg 13												
Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 122.122.216.122.520.721.417.223.821.522.317.729.2AP 127.3Vertice 1000000000000000000000000000000000000	AP 1	65.8												
AP122.128.216.122.520.721.417.223.821.522.317.729.2AP127.3AP127.3Seg13Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP10.630.970.470.590.600.600.500.620.620.620.620.620.620.610.610.610.610.61Seg11Seg12Seg13AP10.630.970.470.590.600.600.600.600.620.620.620.620.620.620.620.620.620.620.620.630.61Seg13						Dens	sity (pc/n	ni/ln)						
Seg 13         Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12           AP 1         0.63         0.97         0.47         0.59         0.60         0.50         0.62         0.62         0.62         0.52         0.52         0.52         0.73           AP 1         0.63         0.97         0.47         0.59         0.60         0.50         0.62         0.62         0.62         0.52         0.52         0.73           AP 1         0.65         Seg 13         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12           AP 1         2.08         2.50         14.2         19.9         18.3         18.9         15.2         21.1         19.5         2.0.3         16.1         2.55           Seg 13         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12           AP 1 </th <th></th> <th>Seg 1</th> <th>Seg 2</th> <th>Seg 3</th> <th>Seg 4</th> <th>Seg 5</th> <th>Seg 6</th> <th>Seg 7</th> <th>Seg 8</th> <th>Seg 9</th> <th>Seg 10</th> <th>Seg 11</th> <th>Seg 12</th>		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12	
AP1       200         Seg1       Seg2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 12         AP1       063       0.97       0.47       0.99       0.60       0.60       0.60       0.62       0.73       6.73       6.63       6.63       7       6.63       8.63       8.63       8.63       8.63       8.61       8.63       8.61	AP 1	22.1	28.2	16.1	22.5	20.7	21.4	17.2	23.8	21.5	22.3	17.7	29.2	
Normanian Colspan="6">Normanian Colspan="6">Normanian Colspan="6">Normanian Colspan="6">Normanian Colspan="6">Normanian Colspan="6">Normanian Colspan="6">Normanian Colspan="6"AP 10.630.970.470.990.600.600.600.62<		Seg 13												
Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11AP 10.630.970.470.590.600.600.600.620.620.620.620.520.73AP 10.75Vertical Seg 13AP 10.75Vertical Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 12.082.501.421.9.91.8.31.8.91.5.221.11.9.52.0.31.6.12.6.5Seg 132.663.62Seg 7Seg 8Seg 9Seg 10Seg 112.6.52.5.5AP 12.662.69Seg 131.8.91.5.221.11.9.52.0.31.6.12.6.5Seg 13AP 12.66Seg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 12.6Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1 <t< th=""><th>AP 1</th><th>27.3</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>	AP 1	27.3												
AP 10.630.970.470.590.600.600.500.620.620.620.620.520.73Seg 13AP 10.75USE Seg 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 120.825.014.219.918.318.915.221.119.520.316.126.5Seg 13Seg 13Seg 13Seg 14Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 124.6USE Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 12.46Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1CDBCCCBCCCBC </td <th></th> <td></td> <td></td> <td></td> <td>D</td> <td>emand -</td> <td>Capacity</td> <td>Ratio (D</td> <td><b>′C)</b></td> <td></td> <td></td> <td></td> <td>-</td>					D	emand -	Capacity	Ratio (D	<b>′C)</b>				-	
Normal Seg 13         Seg 13           AP 1         0.75           Constrained Seg 13         0.75           Seg 1         5eg 2         5eg 3         5eg 5         5eg 6         5eg 7         5eg 8         5eg 9         5eg 10         5eg 11         5eg 12           AP 1         20.8         25.0         14.2         19.9         18.3         18.9         15.2         21.1         19.5         20.3         16.1         26.5           Seg 13         Seg 13         Seg 13         18.9         15.2         21.1         19.5         20.3         16.1         26.5           AP 1         24.6         Seg 13         Seg 13         Seg 14         Seg 15         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         26.5           AP 1         24.6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12           AP 1         .         Seg 13         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12           AP 1         .         .         .         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12	
AP 1       0.75         AP 1       0.75         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 12         AP 1       20.8       25.0       14.2       19.9       18.3       18.9       15.2       21.1       19.5       20.3       16.1       26.5         AP 1       20.8       25.0       14.2       19.9       18.3       18.9       15.2       21.1       19.5       20.3       16.1       26.5         AP 1       24.6             20.4       19.9       18.3       18.9       15.2       21.1       19.5       20.3       16.1       26.5         AP 1       24.6         15.2       21.1       19.5       20.3       16.1       26.5         AP 1       .       .       .       23.1       .       24.8       .       23.9       .       25.7       .       30.3         AP 1       .       .       .       .       23.1       .       24.8       .       23.9       .       25.7       .       . <th>AP 1</th> <th>0.63</th> <th>0.97</th> <th>0.47</th> <th>0.59</th> <th>0.60</th> <th>0.60</th> <th>0.50</th> <th>0.62</th> <th>0.62</th> <th>0.62</th> <th>0.52</th> <th>0.73</th>	AP 1	0.63	0.97	0.47	0.59	0.60	0.60	0.50	0.62	0.62	0.62	0.52	0.73	
Normal ProblemSeg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 120.825.014.219.918.318.915.221.119.520.316.126.5Beg 1324.624.624.624.624.624.7Seg 13Seg 14Seg 13Seg 14Seg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 123.1-24.8-23.9-25.730.3AP 123.1-24.8-23.9-25.730.3AP 123.1-24.8-23.9-25.730.3AP 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1AP 1BCCCBSeg 9Seg 10Seg 11Seg 12Seg 14AP 1 </th <th></th> <th>Seg 13</th> <th></th>		Seg 13												
No AppledSeg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 120.825.014.219.918.318.915.221.119.520.316.126.5AP 124.6Density removes to promisity	AP 1	0.75												
AP 120.825.014.219.918.318.915.221.119.520.316.126.5Seg 13AP 124.6Density in Ramp Influence Area (pc/mi/ln)Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1023.1-24.8-23.9-25.730.3Seg 13Seg 13AP 123.1-24.8-23.9-25.730.3AP 123.1-24.8-23.9-25.730.3AP 123.1-24.8-23.9-25.730.3Seg 13Seg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1BCCCBCCBDBDSeg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1DDemotion of the tot tot tot tot tot tot tot tot tot to						Dens	ity (veh/	mi/ln)						
No. 1         Seg 13           AP 1         24.6           Density in Ramp Influence Area (primi/in)           Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12           AP 1         -         -         23.1         -         24.8         -         23.9         -         25.7         -         30.3           Seg 13         Seg 13         -         24.8         -         23.9         -         25.7         -         30.3           AP 1         -         -         -         23.1         -         24.8         -         23.9         -         25.7         -         30.3           Seg 13         Seg 14         -         -         -         -         -         30.3           AP 1         -         -         -         -         -         -         -         30.3           AP 1         C         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12           AP 1         D		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12	
AP 124.6Density in Ramp Influence Area (p/mi/ln)Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 123.1-24.8-23.9-25.7-30.3AP 123.1-24.8-23.9-25.7-30.3AP 130.3Density in the point of the point	AP 1	20.8	25.0	14.2	19.9	18.3	18.9	15.2	21.1	19.5	20.3	16.1	26.5	
Nervice Second S		Seg 13												
Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 123.1-24.8-23.9-25.7-30.3AP 130.3AP 130.3AP 1	AP 1	24.6												
AP 1       -       -       23.1       -       24.8       -       23.9       -       25.7       -       30.3         Seg 13       -       -       24.8       -       23.9       -       25.7       -       30.3         AP 1       -       -       -       23.1       -       24.8       -       23.9       -       25.7       -       30.3         AP 1       -       -       -       -       -       -       -       -       -       -       30.3         AP 1       -       -       -       -       -       -       -       -       -       30.3         AP 1       - <td< td=""><th></th><td></td><td></td><td></td><td>Density</td><td>in Ramp</td><td>Influenc</td><td>e Area (p</td><td>c/mi/ln)</td><td></td><td></td><td></td><td>-</td></td<>					Density	in Ramp	Influenc	e Area (p	c/mi/ln)				-	
Seg 13AP 1-AP 1-Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1CDBCCBCCCBDAP 1DImage: Seg 13Seg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1DImage: Seg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12	
AP 1.AP 1.Vertical Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1 <th>AP 1</th> <th>-</th> <th>-</th> <th>-</th> <th>23.1</th> <th>-</th> <th>24.8</th> <th>-</th> <th>23.9</th> <th>-</th> <th>25.7</th> <th>-</th> <th>30.3</th>	AP 1	-	-	-	23.1	-	24.8	-	23.9	-	25.7	-	30.3	
Density-Base LOSSeg1Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP 1CDBCCBCCCBDAP 1DDensity-Base LOSSeg13CCCCBDDensity-Base LOSSeg1Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP 1CSeg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP 1CCSeg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP 1Seg1Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP 1CSSSSSSSSSSS		Seg 13												
AP 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1CDBCCBCCBCBDAP 1D	AP 1	-												
AP 1CDBCCBCCBCCBDSeg 13						Dens	sity-Base	d LOS						
AP 1Seg 13AP 1DDemend-Based LOSSeg 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11Seg 12AP 1		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12	
AP 1       D         AP 1       D         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11       Seg 12         AP 1       Image: Amount Amoun	AP 1	С	D	В	С	С	С	В	С	С	С	В	D	
Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11       Seg 12         AP 1       - <td< th=""><th></th><th>Seg 13</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></td<>		Seg 13												
Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 12         AP 1       - <th>AP 1</th> <th>D</th> <th></th>	AP 1	D												
AP 1						Dema	and-Base	d LOS						
		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12	
Seg 13	AP 1	-	-	-	-	-	-	-	-	-	-	-	-	
		Seg 13												

AP 1	-											
				V	olume - (	Capacity	Ratio (V/	C)				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.63	0.97	0.47	0.59	0.60	0.60	0.50	0.62	0.62	0.62	0.52	0.73
	Seg 13											
AP 1	0.75											

## HCS Basic Freeway Report

Project Information			
Analyst	GSH	Date	2/17/23
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	SR-2 West of I-90/SR-2 Merge
Analysis Period Number	1	Segment Analysis Period	08:00-08:15
Geometric Data			
Number of Lanes (N), In	2	Terrain Type	Level
Segment Length (L), ft	4700	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	2690	Heavy Vehicle Adjustment Factor (fHV)	0.943
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1518
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.63
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

		HCS Freeway	y V	Veaving Repo	ort	
Project Information						
Segment Number		2		Segment Name		I-90 b/w SR-2 and SR-57
Analysis Period Number		1		Segment Analysis Pe	riod	08:00-08:15
Geometric Data						
Number of Lanes (N), In		3		Segment Type		Freeway
Segment Length (Ls), ft		4980		Number of Maneuve	r Lanes (NwL), In	2
Weaving Configuration		One-Sided		Ramp-to-Freeway La	ne Changes (LCRF), lc	1
Terrain Type		Level		Freeway-to-Ramp La	ne Changes (LCFR), lc	1
Percent Grade, %		-		Ramp-to-Ramp Lane	Changes (LCRR), lc	0
Interchange Density (ID), int/mi		1.00		Cross Weaving Mana	iged Lane	No
Adjustment Factors				•		•
Driver Population		All Familiar		Final Speed Adjustme	ent Factor (SAF)	1.000
Weather Type		Non-Severe Weath	er	Demand Adjustment	1.000	
Incident Type		No Incident		Capacity Adjustment	Factor for CAVs, CAFCAV	1.000
Proportion of CAVs in Traffic Stream		0		Final Capacity Adjust	ment Factor (CAF)	1.000
Demand and Capacity				A		
		FF		RF	RR	FR
Demand Volume (Vi), veh/h	17	50	10	60	120	940
Peak Hour Factor (PHF)	0.9	)4	0.9	4	0.94	0.94
Total Trucks, %	6.0	00	6.0	0	6.00	13.00
Heavy Vehicle Adjustment Factor (fHV)	0.9	943	0.9	43	0.943	0.885
Flow Rate (vi), pc/h	19	74	119	96	135	1130
Weaving Flow Rate (vw), pc/h	23	26	lde	eal Conditions Capacity	/ (cIFL), pc/h/ln	2400
Non-Weaving Flow Rate (vNW), pc/h	21	09	De	nsity-Based Capacity (	сıwL × N × fнv), veh/h	6018
Total Flow Rate (v), pc/h	44	35	De	mand Flow-Based Cap	oacity (cIW × fHV), veh/h	4251
Volume Ratio (VR)	0.5	524	We	eaving Area Capacity (	cw), veh/h	4251
Minimum Lane Change Rate (LCMIN), lc/h	23	26	Ad	justed Weaving Area (	Capacity (cWA), veh/h	4251
Maximum Weaving Length (LMAX), ft	81	08	Vo	lume-to-Capacity Ratio	o (v/c)	0.97
Speed and Density						
Non-Weaving Vehicle Index (INW)		1050		Average Weaving Sp	eed (Sw), mi/h	60.0
Non-Weaving Lane Change Rate (LCNW), lc	/h	2159		Average Non-Weavir	ng Speed (SNW), mi/h	46.2
Weaving Lane Change Rate (LCW), lc/h		2744		Average Speed (S), m	ni/h	52.5
Weaving Lane Change Rate (LCAII), lc/h		4903		Density (D), pc/mi/ln		28.2
Weaving Intensity Factor (W)		0.223		Level of Service (LOS	)	D

HCS Basic Freeway Report											
Project Information											
Segment Number	3	Segment Name	I-90 below SR-57								
Analysis Period Number	1	Segment Analysis Period	08:00-08:15								
Geometric Data											
Number of Lanes (N), In	3	Terrain Type	Level								
Segment Length (L), ft	2720	Percent Grade, %	-								
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-								
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.17								
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0								
Right-Side Lateral Clearance, ft	-										
Adjustment Factors		•	•								
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000								
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000								
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000								
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000								
Demand and Capacity	- -	- -									
Demand Volume (V), veh/h	2810	Heavy Vehicle Adjustment Factor (fHV)	0.885								
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1126								
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400								
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400								
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400								
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.47								
Speed and Density		•	•								
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0								
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.1								
Total Ramp Density Adjustment	-	Level of Service (LOS)	В								
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0										

rioject information				
Segment Number 4		Segment Name	I-90 Entra	nce Ramp from SR-57
Analysis Period Number 1		Segment Analysis Period	08:00-08:	15
Geometric Data		· · ·		
		Freeway	Ramp	
Number of Lanes (N), In		3	1	
Free-Flow Speed (FFS), mi/h		70.0	55.0	
Segment Length (L) / Acceleration Length	(LA), ft	1500	730	
Terrain Type		Level	Level	
Percent Grade, %		-	-	
Segment Type / Ramp Type		Freeway	Right-Side	ed One-Lane
Adjustment Factors				
Driver Population		All Familiar	All Familia	ır
Weather Type		Non-Severe Weather	Non-Seve	re Weather
Incident Type		No Incident	-	
Proportion of CAVs in Traffic Stream		0	-	
Final Speed Adjustment Factor (SAF)		1.000	1.000	
Demand Adjustment Factor (DAF)		1.000	1.000	
Capacity Adjustment Factor for CAVs, CAF	CAV	1.000	-	
Final Capacity Adjustment Factor (CAF)		1.000	1.000	
Demand and Capacity				
Demand Volume (Vi), veh/h		2810	770	
Peak Hour Factor (PHF)		0.94	0.94 0.94	
Total Trucks, %		13.00	6.00	
Heavy Vehicle Adjustment Factor (fHV)		0.885	0.943	
Flow Rate (vi), pc/h		3378	869	
Capacity (cmd), pc/h		7200	2200	
Adjusted Capacity (cmda), pc/h		7200	2200	
Volume-to-Capacity Ratio (v/c)		0.59	0.40	
Speed and Density				
Upstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/	In	1358
Downstream Equilibrium Distance (LEQ), ft	3420.2	On-Ramp Influence Area Speed (SR), mi/h 61.3		61.3
Flow in Lanes 1 and 2 (v12), pc/h	2020	Outer Lanes Freeway Speed (S	way Speed (SO), mi/h 66.9	
Flow Entering Ramp-Infl. Area (vR12), pc/h	2889	Ramp Junction Speed (S), mi/l	h	63.0
Number of Outer Lanes on Freeway (NO),	n 1	Average Density (D), pc/mi/ln		22.5
Level of Service (LOS)	С	Density in Ramp Influence Are	ea (DR), pc/mi/ln	23.1

HCS Basic Freeway Report											
Project Information											
Segment Number	5	Segment Name	I-90 b/w SR-57 and SR-254								
Analysis Period Number	1	Segment Analysis Period	08:00-08:15								
Geometric Data											
Number of Lanes (N), In	3	Terrain Type	Level								
Segment Length (L), ft	7240	Percent Grade, %	-								
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-								
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83								
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0								
Right-Side Lateral Clearance, ft	-										
Adjustment Factors											
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000								
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000								
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000								
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000								
Demand and Capacity											
Demand Volume (V), veh/h	3580	Heavy Vehicle Adjustment Factor (fHV)	0.885								
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1434								
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400								
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400								
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400								
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.60								
Speed and Density											
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.4								
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.7								
Total Ramp Density Adjustment	-	Level of Service (LOS)	с								
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0										

Project information					
Segment Number 6	5		Segment Name	I-90 Exit R	amp to SR-254
Analysis Period Number 1			Segment Analysis Period	08:00-08:1	5
Geometric Data			•		
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			70.0	55.0	
Segment Length (L) / Deceleration Le	ength (LD),	ft	1500	510	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	r
Weather Type			Non-Severe Weather	Non-Sever	re Weather
Incident Type			No Incident	-	
Proportion of CAVs in Traffic Stream			0	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000	
Capacity Adjustment Factor for CAVs,	, CAFcav		1.000	-	
Final Capacity Adjustment Factor (CA	νF)		1.000	1.000	
Demand and Capacity					
Demand Volume (Vi), veh/h			3580	580	
Peak Hour Factor (PHF)			0.94	0.94	
Total Trucks, %			13.00	4.00	
Heavy Vehicle Adjustment Factor (fHV	/)		0.885	0.962	
Flow Rate (vi), pc/h			4303	641	
Capacity (cmd), pc/h			7200	2200	
Initial Adjusted Capacity (cmda), pc/h			7200	-	
Final Adjusted Capacity (cmda), pc/h			7200	2200	
Volume-to-Capacity Ratio (v/c)			0.60	0.29	
Speed and Density					
Upstream Equilibrium Distance (LEQ),	ft	7158.6	Flow Outer Lanes (vOA), pc/h/ln		1381
Downstream Equilibrium Distance (Le	EQ), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	63.7
Flow in Lanes 1 and 2 (v12), pc/h		2922	Outer Lanes Freeway Speed (SO)	), mi/h	75.3
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h		67.0
Number of Outer Lanes on Freeway (	(No), In	1	Average Density (D), pc/mi/ln		21.4
Level of Service (LOS)		С	Density in Ramp Influence Area	(DR), pc/mi/ln	24.8

HCS Basic Freeway Report											
Project Information											
Segment Number	7	Segment Name	I-90 below SR-254								
Analysis Period Number	1	Segment Analysis Period	08:00-08:15								
Geometric Data											
Number of Lanes (N), In	3	Terrain Type	Level								
Segment Length (L), ft	2330	Percent Grade, %	-								
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-								
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83								
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0								
Right-Side Lateral Clearance, ft	-										
Adjustment Factors	•	•	•								
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000								
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000								
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000								
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000								
Demand and Capacity											
Demand Volume (V), veh/h	3000	Heavy Vehicle Adjustment Factor (fHV)	0.885								
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1202								
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400								
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400								
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400								
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.50								
Speed and Density											
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9								
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.2								
Total Ramp Density Adjustment	-	Level of Service (LOS)	В								
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0										

rioject mormation					
Segment Number 8	3		Segment Name	I-90 Entrar	nce Ramp from SR-254
Analysis Period Number	1		Segment Analysis Period	08:00-08:1	5
Geometric Data			•		
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			70.0	55.0	
Segment Length (L) / Acceleration Le	ength (LA),	ft	1500	800	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Proportion of CAVs in Traffic Stream			0	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000	
Capacity Adjustment Factor for CAVs	, CAFcav		1.000	-	
Final Capacity Adjustment Factor (CA	AF)		1.000	1.000	
Demand and Capacity					
Demand Volume (Vi), veh/h			3000	810	
Peak Hour Factor (PHF)			0.94	0.94 0.94	
Total Trucks, %			13.00	3.00	
Heavy Vehicle Adjustment Factor (fH	V)		0.885	0.971	
Flow Rate (vi), pc/h			3606	887	
Capacity (cmd), pc/h			7200	2200	
Adjusted Capacity (cmda), pc/h			7200	2200	
Volume-to-Capacity Ratio (v/c)			0.62	0.40	
Speed and Density					
Upstream Equilibrium Distance (LEQ)	, ft	1791.3	Flow Outer Lanes (vOA), pc/h/ln		1442
Downstream Equilibrium Distance (L	EQ), ft	3775.6	On-Ramp Influence Area Speed	(SR), mi/h	61.2
Flow in Lanes 1 and 2 (v12), pc/h		2164	Outer Lanes Freeway Speed (So)	), mi/h	66.6
Flow Entering Ramp-Infl. Area (vR12),	, pc/h	3051	Ramp Junction Speed (S), mi/h		62.8
Number of Outer Lanes on Freeway	f Outer Lanes on Freeway (NO), In 1 Average Density (D), pc/mi/ln 23.8		23.8		
Level of Service (LOS)		с	Density in Ramp Influence Area	(DR), pc/mi/ln	23.9

	HCS Basic Fr	eeway Report			
Project Information					
Segment Number	9	Segment Name	I-90 b/w SR-254 and SR-611		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	11310	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	3810	Heavy Vehicle Adjustment Factor (fHV)	0.909		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1486		
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.62		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.1		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.5		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information							
Segment Number	10		Segment Name	I-90 Exit R	amp to SR-611		
Analysis Period Number	1		Segment Analysis Period	08:00-08:1	5		
Geometric Data				·			
			Freeway	Ramp			
Number of Lanes (N), In			3	1			
Free-Flow Speed (FFS), mi/h			70.0	55.0			
Segment Length (L) / Deceleration L	ength (LD)	, ft	1500	510			
Terrain Type			Level	Level			
Percent Grade, %			-	-			
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane		
Adjustment Factors							
Driver Population			All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	re Weather		
Incident Type			No Incident	-			
Proportion of CAVs in Traffic Stream			0	-			
Final Speed Adjustment Factor (SAF)			1.000	1.000			
Demand Adjustment Factor (DAF)			1.000	1.000			
Capacity Adjustment Factor for CAV	s, CAFcav		1.000	-			
Final Capacity Adjustment Factor (C	AF)		1.000	1.000			
Demand and Capacity							
Demand Volume (Vi), veh/h			3810 630				
Peak Hour Factor (PHF)			0.94	0.94			
Total Trucks, %			10.00	10.00 10.00			
Heavy Vehicle Adjustment Factor (fH	IV)		0.909				
Flow Rate (vi), pc/h			4459	737			
Capacity (cmd), pc/h			7200	2200			
Initial Adjusted Capacity (cmda), pc/h	ı		7200	-			
Final Adjusted Capacity (cmda), pc/h			7200	2200			
Volume-to-Capacity Ratio (v/c)			0.62	0.34			
Speed and Density							
Upstream Equilibrium Distance (LEQ)	), ft	7554.6	Flow Outer Lanes (vOA), pc/h/lr	n	1433		
Downstream Equilibrium Distance (L	.EQ), ft	-	Off-Ramp Influence Area Speed	d (SR), mi/h	63.4		
Flow in Lanes 1 and 2 (v12), pc/h		3026	Outer Lanes Freeway Speed (SO), mi/h 75.1				
Flow Entering Ramp-Infl. Area (vR12)	, pc/h	-	Ramp Junction Speed (S), mi/h		66.7		
Number of Outer Lanes on Freeway			Average Density (D) ne (mi (ln		22.3		
,	(NO), In	1	Average Density (D), pc/mi/ln		22.3		

	HCS Basic Freeway Report										
Project Information											
Segment Number	11	Segment Name	I-90 below SR-611 (3-lane section)								
Analysis Period Number	1	Segment Analysis Period	08:00-08:15								
Geometric Data											
Number of Lanes (N), In	3	Terrain Type	Level								
Segment Length (L), ft	2560	Percent Grade, %	-								
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-								
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83								
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0								
Right-Side Lateral Clearance, ft	-										
Adjustment Factors											
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000								
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000								
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000								
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000								
Demand and Capacity											
Demand Volume (V), veh/h	3180	Heavy Vehicle Adjustment Factor (fHV)	0.909								
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1241								
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400								
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400								
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400								
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.52								
Speed and Density											
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9								
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.7								
Total Ramp Density Adjustment	-	Level of Service (LOS)	В								
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0										

roject mormation							
Segment Number	12		Segment Name	I-90 Entrar	nce Ramp from SR-611		
Analysis Period Number	1		Segment Analysis Period	08:00-08:1	5		
Geometric Data			·				
			Freeway	Ramp			
Number of Lanes (N), In			3	1			
Free-Flow Speed (FFS), mi/h			70.0	55.0			
Segment Length (L) / Acceleration Le	ength (LA),	ft	1500	640			
Terrain Type			Level	Level			
Percent Grade, %			-	-			
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane		
Adjustment Factors			•				
Driver Population			All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	re Weather		
Incident Type			No Incident	-			
Proportion of CAVs in Traffic Stream			0	-	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000			
Demand Adjustment Factor (DAF)			1.000	1.000			
Capacity Adjustment Factor for CAVs	, CAFcav		1.000	-			
Final Capacity Adjustment Factor (CA	AF)		1.000	1.000			
Demand and Capacity							
Demand Volume (Vi), veh/h			3180 1390				
Peak Hour Factor (PHF)			0.94	0.94			
Total Trucks, %			10.00	6.00			
Heavy Vehicle Adjustment Factor (fH	V)		0.909	0.943			
Flow Rate (vi), pc/h			3722	1568			
Capacity (cmd), pc/h			7200	2200			
Adjusted Capacity (cmda), pc/h			7200	2200			
Volume-to-Capacity Ratio (v/c)			0.73	0.71			
Speed and Density							
Upstream Equilibrium Distance (LEQ)	, ft	1890.8	Flow Outer Lanes (vOA), pc/h/ln	l	1507		
Downstream Equilibrium Distance (L	EQ), ft	-	On-Ramp Influence Area Speed	58.2			
Flow in Lanes 1 and 2 (v12), pc/h		2215	Outer Lanes Freeway Speed (SO), mi/h 66.4				
Flow Entering Ramp-Infl. Area (vR12),	, pc/h	3783	Ramp Junction Speed (S), mi/h		60.3		
Number of Outer Lanes on Freeway	1	Average Density (D), pc/mi/ln   29.2					
Level of Service (LOS)		D	Density in Ramp Influence Area (DR), pc/mi/ln 30.3				

	HCS Basic F	reeway Report			
Project Information					
Segment Number	13	Segment Name	I-90 east of SR-611		
Analysis Period Number	1	Segment Analysis Period	08:00-08:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	3230	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors	1				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	4570	Heavy Vehicle Adjustment Factor (fHV)	0.901		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1799		
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.75		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	65.8		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	27.3		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

HCSTM Freeways Version 2023 I-90 EB 2045 AM - OPTION 2 AND 3.xuf

Generated: 08/24/2023 15:06:55

### HCS Freeway Facilities Report

#### **Project Information**

Analyst	GSH	Date	2/17/23		
Agency	СМТ	Analysis Year	2045		
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV		
Facility Name	I-90 EB OPTIONS 2 AND 3	Units	U.S. Customary		
Project Description	PID 107714 LOR-90-10.76				

#### Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	13
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	9.01		

#### Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	SR-2 West of I-90/SR-2 Merge	4700	2
2	Weaving	Weaving	I-90 b/w SR-2 and SR-57	5980	3
3	Basic	Basic	I-90 below SR-57	2720	3
4	Merge	Merge	I-90 Entrance Ramp from SR-57	1500	3
5	Basic	Basic	I-90 b/w SR-57 and SR-254	7240	3
6	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	3
7	Basic	Basic	I-90 below SR-254	2330	3
8	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	3
9	Basic	Basic	I-90 b/w SR-254 and SR-611	11310	3
10	Diverge	Diverge	I-90 Exit Ramp to SR-611	1500	3
11	Basic	Basic	I-90 below SR-611 (3-lane section)	2560	3
12	Merge	Merge	I-90 Entrance Ramp from SR-611	1500	3
13	Basic	Basic	I-90 east of SR-611	3230	3

#### Facility Segment Data

				Segment 1: Ba	asic								
АР	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS					
1	0.94	0.943	3226	4800	0.67	68.0	23.7	С					
	Segment 2: Weaving												
АР	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS					
1	0.94	0.943	4067	5162	0.79	54.3	25.0	С					
	-	-		Segment 3: Ba	asic								
АР	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS					
1	0.94	0.885	2969	7200	0.41	70.0	14.1	В					

							Segmer	nt 4: Me	erge						
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.943	3849	880	7200	2200	0.53	0.40	63.4	61.7	20.2	21.3	C
							Segme	nt 5: Ba	asic						
AP	AP PHF fHV		IV	Flow Rate (pc/h)		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS	
1	0.9	94	0.8	85	39	)7	720	00	0.	54	69	9.9	18	3.6	С
							Segmen	t 6: Div	erge						
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		isity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.962	3907	697	7200	2200	0.54	0.32	66.9	63.5	19.5	23.0	C
Segment 7: Basic															
AP	P PHF fHV		IV	Flow (pc,		Capa (pc/		d, Ra	/c tio		eed i/h)		isity ni/ln)	LOS	
1	0.9	0.94 0.885		85	314	49	720	00	0.44		69.9		15.0		В
Segment 8: Merge															
AP	P PHF fHV		IV	Flow (pc,		Capacity (pc/h)		d/c Ratio		Speed (mi/h)			isity ni/ln)	LOS	
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.885	0.971	3993	844	7200	2200	0.55	0.38	63.4	61.8	21.0	21.5	C
							Segme	nt 9: Ba	asic						
AP	Pł	łF	fŀ	IV	Flow Rate (pc/h)		Capacity (pc/h)			/c tio	Speed (mi/h)		Density (pc/mi/ln)		LOS
1	0.9	94	0.9	909	39	67	720	00	0.	55	69	9.8	18.9		C
						9	Segment	10: Div	/erge						
AP	Pł	łF	fŀ	IV	Flow (pc,		Capacity (pc/h)		d/c Ratio			eed i/h)		isity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.909	0.909	3967	609	7200	2200	0.55	0.28	67.1	63.8	19.7	23.2	C
							Segmer	nt 11: B	asic						
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc,		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	909	33	59	720	00	0.4	47	69	9.9	16	5.0	В
							Segmen	t 12: M	erge						
AP	Pł	HF	fŀ	IV	Flow (pc,		Capa (pc,			/c tio		eed i/h)		isity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.909	0.943	4577	1218	7200	2200	0.64	0.55	62.1	60.3	24.6	26.1	С
							Segmer	nt 13: B	asic						
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/			/c tio		eed i/h)		isity ni/ln)	LOS

1	0.94	0.901	4664	7200		0.65	68.5			22.7	С		
Fac	ility Analys	is Results											
АР	VMT veh-mi/AP	VMT-Demand veh-mi/AP	l VHD veh-h/AP	Total Delay C \$/AP	ost	Speed mi/h	Density pc/mi/ln		Density TT eh/mi/ln min		LOS		
1	7808	6972	6.60	165.04		6.60 165.04		66.1	19.9	18	.0	8.20	С
Fac	ility Overal	l Results											
Spac	e Mean Speed,	mi/h	66.1		Average Density, veh/mi/ln 18.0								
Aver	age Travel Time	, min	8.20 Average Density, pc/mi/ln				19.9	)					
Total VMT, veh-mi 7808					Total VHD, veh-h			6.60	6.60				
Vehicle Value of Time (VOT), \$/h 25.00 1					Total Delay Cost, \$			165	.04				

HCSTM Freeways Version 2023 I-90 EB 2045 PM - OPTION 2 AND 3.xuf Generated: 08/24/2023 15:09:33

Seq1Seq2Seq3Seq3Seq4Seq5Seq6Seq7Seq3Seq10Seq11Seq12AP1CCC <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th>LOS</th><th></th><th></th><th></th><th></th><th></th><th></th></td<>							LOS								
AP 1Seg 1Seg 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 3Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 3Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11AP 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11AP 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 3Seg 4Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12		
AP 1         O           Seg1         Seg2         Seg3         Seg4         Seg5         Seg6         Seg7         Seg8         Seg1         Seg13         Seg14         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12         Seg 1	AP 1	С	С	В	С	С	С	В	С	С	С	В	С		
Specific Signer		Seg 13													
Seq 1         Seq 2         Seg 3         Seq 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12           AP 1         GG0         S43         700         G14         609         649         634         638         670         609         621           Seg 13         Seg 13         Seg 14         689         689         Seg 8         638         670         638         670         639         670         639         670         639         670         639         670         639         670         639         670         639         670         639         690         691	AP 1	С													
AP 1ColorC						S	peed (mi	/h)							
AP 1Seg 13AP 1663Image: Seg 1Seg 1Seg 1Seg 2Seg 3Seg 4Seg 6Seg 8Seg 8 <td c<="" th=""><th></th><th>Seg 1</th><th>Seg 2</th><th>Seg 3</th><th>Seg 4</th><th>Seg 5</th><th>Seg 6</th><th>Seg 7</th><th>Seg 8</th><th>Seg 9</th><th>Seg 10</th><th>Seg 11</th><th>Seg 12</th></td>	<th></th> <th>Seg 1</th> <th>Seg 2</th> <th>Seg 3</th> <th>Seg 4</th> <th>Seg 5</th> <th>Seg 6</th> <th>Seg 7</th> <th>Seg 8</th> <th>Seg 9</th> <th>Seg 10</th> <th>Seg 11</th> <th>Seg 12</th>		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12	
AP 1EdsUSURVISION SUPPORT6 Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 122.014.120.218.619.515.021.018.919.716.024.0AP 122.720.014.120.218.619.515.021.018.919.716.024.0AP 120.720.720.8Seg 1320.510.610.510.624.010.510.624.0AP 15691592Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 13AP 10.670.790.410.580.580.480.580.	AP 1	68.0	54.3	70.0	63.4	69.9	66.9	69.9	63.4	69.8	67.1	69.9	62.1		
DescriptionVerticial6eg 136eg 26eg 36eg 46eg 56eg 66eg 76eg 86eg 96eg 106eg 116eg 12AP 12cr<		Seg 13													
Seg1Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP12.372.5014.12.0218.619.515.02.1018.919.716.02.46Seg13Seg13Seg13Seg142.0218.619.515.02.1018.919.716.02.46AP12.77Seg13Seg1Seg14Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP10.670.790.410.530.540.540.440.550.560.550.470.64Seg13Seg13Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP10.65Seg7Seg8Seg9Seg10Seg11Seg12Seg11Seg12Seg11Seg12AP10.65Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP10.55Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP12.2212.517.916.517.313.318.617.217.914.52.24AP12.23Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1Seg13Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9 <td>AP 1</td> <td>68.5</td> <td></td>	AP 1	68.5													
AP123.725.014.120.218.619.515.021.018.919.716.024.6Seg 1355 <t< td=""><td></td><td></td><td></td><td></td><td></td><td>Dens</td><td>sity (pc/n</td><td>ni/ln)</td><td></td><td></td><td></td><td></td><td></td></t<>						Dens	sity (pc/n	ni/ln)							
Seq 1 AP1Seq 2 Seq 3Seq 4 Seq 4Seq 5 Seq 6Seq 7 Seq 8 Seq 7Seq 8 Seq 5Seq 10 Seg 10Seg 11 Seg 12AP10.670.790.410.510.540.440.550.550.550.6470.64Seg 13Seg 130.510.540.540.440.550.550.550.6470.64AP10.667Seg 13Seg 120.540.540.540.550.550.550.6470.64AP10.66Seg 13Seg 12Seg 14Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP12.232.2212.517.916.517.313.318.617.217.914.52.24AP12.032.2212.517.916.517.313.318.617.217.914.52.24AP12.05Seg 13Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP12.02.13.2.30.21.5.2.32.2.51AP132.30.21.52.51AP1 <t< td=""><td></td><td>Seg 1</td><td>Seg 2</td><td>Seg 3</td><td>Seg 4</td><td>Seg 5</td><td>Seg 6</td><td>Seg 7</td><td>Seg 8</td><td>Seg 9</td><td>Seg 10</td><td>Seg 11</td><td>Seg 12</td></t<>		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12		
AP1       2.2         V       Seg1       Seg2       Seg3       Seg4       Seg5       Seg6       Seg7       Seg8       Seg9       Seg10       Seg11       Seg12         AP1       0.67       0.79       0.41       0.53       0.54       0.54       0.55       0.55       0.55       0.47       0.64         AP1       0.67       0.79       0.41       0.53       0.54       0.54       0.55       0.55       0.47       0.64         AP1       0.66        Seg13       Seg4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 12         AP1       0.65       22.2       12.5       17.9       16.5       17.3       13.3       18.6       17.2       17.9       14.5       22.4         AP1       22.3       22.2       12.5       17.9       16.5       17.3       13.3       18.6       17.2       17.9       14.5       22.4         AP1       20.5       Seg 13       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 12         AP1       -       .       . <td< td=""><td>AP 1</td><td>23.7</td><td>25.0</td><td>14.1</td><td>20.2</td><td>18.6</td><td>19.5</td><td>15.0</td><td>21.0</td><td>18.9</td><td>19.7</td><td>16.0</td><td>24.6</td></td<>	AP 1	23.7	25.0	14.1	20.2	18.6	19.5	15.0	21.0	18.9	19.7	16.0	24.6		
Nerror Department of University Reprint Series and Series Series 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 10.670.790.410.530.640.640.550.650.650.640.64Seg 13Seg 13AP 10.65Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 12.232.2212.517.916.517.313.318.617.217.914.52.24AP 12.5Seg 1Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 12.5Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1CCBCCBC <td></td> <td>Seg 13</td> <td></td>		Seg 13													
Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 10.670.790.410.530.540.540.440.550.550.550.470.64Seg 13AP 10.66Seg 13Seg 13Seg 13Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 12.232.2212.517.916.517.313.318.617.217.914.522.4AP 12.052.517.916.517.313.318.617.217.914.522.4Seg 13Seg 13Seg 13Seg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1CCBC	AP 1	22.7													
AP 10.670.790.410.530.540.540.440.550.550.550.470.64Seg 13AP 10.65Version Version Versi		Demand - Capacity Ratio (D/C)													
Norm AP1Seg 13AP10.65Densitive NormDensitive NormDensitive Norm22.3Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP122.322.212.517.916.517.313.318.617.217.914.522.4AP120.517.517.313.318.617.217.914.522.4Densitive NormDensitive Norm															

AP 1	-											
Volume - Capacity Ratio (V/C)												
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.67	0.79	0.41	0.53	0.54	0.54	0.44	0.55	0.55	0.55	0.47	0.64
	Seg 13											
AP 1	0.65											

### HCS Basic Freeway Report

Project Information					
Analyst	GSH	Date	2/17/23		
Agency	СМТ	Analysis Year	2045		
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV		
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary		
Segment Number	1	Segment Name	SR-2 West of I-90/SR-2 Merge		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	2	Terrain Type	Level		
Segment Length (L), ft	4700	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	2860	Heavy Vehicle Adjustment Factor (fHV)	0.943		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1613		
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.67		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.0		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	23.7		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

		HCS Freeway	y V	Veaving Repo	rt	
Project Information						
Segment Number		2		Segment Name		I-90 b/w SR-2 and SR-57
Analysis Period Number	Analysis Period Number 1			Segment Analysis Pe	riod	16:00-16:15
Geometric Data						
Number of Lanes (N), In		3		Segment Type		Freeway
Segment Length (Ls), ft		4980		Number of Maneuve	r Lanes (NWL), İn	2
Weaving Configuration		One-Sided		Ramp-to-Freeway La	ne Changes (LCRF), lc	1
Terrain Type		Level		Freeway-to-Ramp La	ne Changes (LCFR), lc	1
Percent Grade, %		-		Ramp-to-Ramp Lane	Changes (LCRR), lc	0
Interchange Density (ID), int/mi		1.00		Cross Weaving Mana	ged Lane	No
Adjustment Factors				• •		- -
Driver Population	_	All Familiar	_	Final Speed Adjustme	ent Factor (SAF)	1.000
Weather Type		Non-Severe Weath	er	Demand Adjustment Factor (DAF)		1.000
Incident Type		No Incident Capacity Adjustment		Factor for CAVs, CAFCAV	1.000	
Proportion of CAVs in Traffic Stream		0		Final Capacity Adjustment Factor (CAF)		1.000
Demand and Capacity				A		
		FF		RF	RR	FR
Demand Volume (Vi), veh/h	18	60	61	0	70	1000
Peak Hour Factor (PHF)	0.9	)4	0.9	4	0.94	0.94
Total Trucks, %	6.0	00	6.0	0	6.00	13.00
Heavy Vehicle Adjustment Factor (fHV)	0.9	943	0.9	43	0.943	0.885
Flow Rate (vi), pc/h	20	98	688	8	79	1202
Weaving Flow Rate (vw), pc/h	18	90	lde	eal Conditions Capacity (cIFL), pc/h/ln		2400
Non-Weaving Flow Rate (vNW), pc/h	21	77	De	ensity-Based Capacity (cIWL × N × fHV), veh/h		6147
Total Flow Rate (v), pc/h	40	67	De	mand Flow-Based Cap	acity (cIW × fHV), veh/h	4779
Volume Ratio (VR)	0.4	165	We	eaving Area Capacity (	cw), veh/h	4779
Minimum Lane Change Rate (LCMIN), lc/h	18	90	Ad	justed Weaving Area C	Capacity (cWA), veh/h	4779
Maximum Weaving Length (LMAX), ft	74	420 Volume-to-Capacity Ratio (v/c)		0.79		
Speed and Density						
Non-Weaving Vehicle Index (INW)		1084		Average Weaving Speed (SW), mi/h		60.5
Non-Weaving Lane Change Rate (LCNW), lc	/h	2174		Average Non-Weavir	ng Speed (SNW), mi/h	49.9
Weaving Lane Change Rate (LCW), lc/h		2308		Average Speed (S), m	i/h	54.3
Weaving Lane Change Rate (LCAII), lc/h		4482		Density (D), pc/mi/ln		25.0
Weaving Intensity Factor (W)		0.208		Level of Service (LOS)	)	С

HCS Basic Freeway Report						
Project Information	Project Information					
Segment Number	3	Segment Name	I-90 below SR-57			
Analysis Period Number	1	Segment Analysis Period	16:00-16:15			
Geometric Data						
Number of Lanes (N), In	3	Terrain Type	Level			
Segment Length (L), ft	2720	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.17			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors	•					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	2470	Heavy Vehicle Adjustment Factor (fHV)	0.885			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	990			
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.41			
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	14.1			
Total Ramp Density Adjustment	-	Level of Service (LOS)	В			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

Project information					
Segment Number 4		Segment Name	I-90 Entra	nce Ramp from SR-57	
Analysis Period Number 1		Segment Analysis Period	16:00-16:	15	
Geometric Data					
		Freeway	Ramp		
Number of Lanes (N), In		3	1		
Free-Flow Speed (FFS), mi/h		70.0	55.0		
Segment Length (L) / Acceleration Lengtl	h (LA), ft	1500	730		
Terrain Type		Level	Level		
Percent Grade, %		-	-		
Segment Type / Ramp Type		Freeway	Right-Side	ed One-Lane	
Adjustment Factors					
Driver Population		All Familiar	All Familia	ar	
Weather Type		Non-Severe Weather	Non-Seve	re Weather	
Incident Type		No Incident	-		
Proportion of CAVs in Traffic Stream		0	-	-	
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000	
Demand Adjustment Factor (DAF)		1.000	1.000	1.000	
Capacity Adjustment Factor for CAVs, CA	Fcav	1.000	-		
Final Capacity Adjustment Factor (CAF)		1.000	1.000		
Demand and Capacity					
Demand Volume (Vi), veh/h		2470	780		
Peak Hour Factor (PHF)		0.94	0.94	0.94	
Total Trucks, %		13.00	6.00	6.00	
Heavy Vehicle Adjustment Factor (fHV)		0.885	0.943	0.943	
Flow Rate (vi), pc/h		2969	880	880	
Capacity (cmd), pc/h		7200	2200	2200	
Adjusted Capacity (cmda), pc/h		7200	2200	2200	
Volume-to-Capacity Ratio (v/c)		0.53	0.53 0.40		
Speed and Density					
Upstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h,	/In	1194	
Downstream Equilibrium Distance (LEQ), t	ft 3713.2	On-Ramp Influence Area Spe	On-Ramp Influence Area Speed (SR), mi/h		
Flow in Lanes 1 and 2 (v12), pc/h	1775	Outer Lanes Freeway Speed (	Outer Lanes Freeway Speed (SO), mi/h		
Flow Entering Ramp-Infl. Area (vR12), pc/	h 2655	Ramp Junction Speed (S), mi,	/h	63.4	
Number of Outer Lanes on Freeway (No)	, In 1	Average Density (D), pc/mi/lr	1	20.2	
Level of Service (LOS)	С	Density in Ramp Influence Ar	Density in Ramp Influence Area (DR), pc/mi/ln 21.3		

HCS Basic Freeway Report					
Project Information					
Segment Number	5	Segment Name	I-90 b/w SR-57 and SR-254		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	7240	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	3250	Heavy Vehicle Adjustment Factor (fHV)	0.885		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1302		
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.54		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.6		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information						
Segment Number 6	5		Segment Name	I-90 Exit R	amp to SR-254	
Analysis Period Number 1	1		Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD),	, ft	1500	510		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs	, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			3250	630		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			13.00	4.00		
Heavy Vehicle Adjustment Factor (fH	V)		0.885	0.962	0.962	
Flow Rate (vi), pc/h			3907	697		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h			7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.54	0.32		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	, ft	8156.5	Flow Outer Lanes (vOA), pc/h/ln		1188	
Downstream Equilibrium Distance (Li	EQ), ft	-	Off-Ramp Influence Area Speed (	SR), mi/h	63.5	
Flow in Lanes 1 and 2 (v12), pc/h		2719	Outer Lanes Freeway Speed (SO),	mi/h	76.1	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h	Ramp Junction Speed (S), mi/h		
Number of Outer Lanes on Freeway	(NO), In	1	Average Density (D), pc/mi/ln		19.5	
Level of Service (LOS)		С	Density in Ramp Influence Area (	DR), pc/mi/ln	23.0	

HCS Basic Freeway Report						
Project Information	Project Information					
Segment Number	7	Segment Name	I-90 below SR-254			
Analysis Period Number	1	Segment Analysis Period	16:00-16:15			
Geometric Data	Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level			
Segment Length (L), ft	2330	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors		-	•			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	2620	Heavy Vehicle Adjustment Factor (fHV)	0.885			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1050			
Total Trucks, %	13.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.44			
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.0			
Total Ramp Density Adjustment	-	Level of Service (LOS)	В			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

Project mormation						
Segment Number 8			Segment Name	I-90 Entrar	nce Ramp from SR-254	
Analysis Period Number 1			Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Le	ngth (LA), ft	:	1500	800		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			•			
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-			
Final Capacity Adjustment Factor (CAI	F)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2620	770		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			13.00	3.00	3.00	
Heavy Vehicle Adjustment Factor (fHV	')		0.885	0.971	0.971	
Flow Rate (vi), pc/h			3149	844		
Capacity (cmd), pc/h			7200	2200		
Adjusted Capacity (cmda), pc/h			7200	2200	2200	
Volume-to-Capacity Ratio (v/c)			0.55	0.38		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft 1	1684.3	Flow Outer Lanes (vOA), pc/h/ln		1260	
Downstream Equilibrium Distance (LE	Q), ft 3	3119.9	On-Ramp Influence Area Speed	l (SR), mi/h	61.8	
Flow in Lanes 1 and 2 (v12), pc/h	1	1889	Outer Lanes Freeway Speed (SC	), mi/h	67.3	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 2	2733	Ramp Junction Speed (S), mi/h		63.4	
Number of Outer Lanes on Freeway (I	No), In 1	1	Average Density (D), pc/mi/ln		21.0	
Level of Service (LOS)	C	C	Density in Ramp Influence Area	(DR), pc/mi/ln	21.5	

HCS Basic Freeway Report					
Project Information					
Segment Number	9	Segment Name	I-90 b/w SR-254 and SR-611		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	11310	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	3390	Heavy Vehicle Adjustment Factor (fHV)	0.909		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1322		
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.55		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.8		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.9		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information						
Segment Number	10		Segment Name	I-90 Exit R	amp to SR-611	
Analysis Period Number	1		Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD)	, ft	1500	510		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs	, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			3390	520		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			10.00	10.00		
Heavy Vehicle Adjustment Factor (fH	V)		0.909	0.909	0.909	
Flow Rate (vi), pc/h			3967	609		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h	l		7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.55	0.28		
Speed and Density						
Upstream Equilibrium Distance (LEQ)	, ft	7278.6	Flow Outer Lanes (vOA), pc/h/l	n	1232	
Downstream Equilibrium Distance (L	EQ), ft	-	Off-Ramp Influence Area Spee	d (SR), mi/h	63.8	
Flow in Lanes 1 and 2 (v12), pc/h		2735	Outer Lanes Freeway Speed (Se	0), mi/h	75.9	
Flow Entering Ramp-Infl. Area (vR12),	, pc/h	-	Ramp Junction Speed (S), mi/h	Ramp Junction Speed (S), mi/h		
Number of Outer Lanes on Freeway	(No), In	1	Average Density (D), pc/mi/ln		19.7	
Level of Service (LOS)		с	Density in Ramp Influence Area	a (DR), pc/mi/ln	23.2	
		-	-			

HCS Basic Freeway Report				
Project Information				
Segment Number	11	Segment Name	I-90 below SR-611 (3-lane section)	
Analysis Period Number	1	Segment Analysis Period	16:00-16:15	
Geometric Data				
Number of Lanes (N), In	3	Terrain Type	Level	
Segment Length (L), ft	2560	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83	
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000	
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000	
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000	
Demand and Capacity				
Demand Volume (V), veh/h	2870	Heavy Vehicle Adjustment Factor (fHV)	0.909	
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1120	
Total Trucks, %	10.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400	
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400	
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.47	
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.0	
Total Ramp Density Adjustment	-	Level of Service (LOS)	В	
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0			

rioject mormation						
Segment Number 1	2		Segment Name	I-90 Entra	nce Ramp from SR-611	
Analysis Period Number 1			Segment Analysis Period	16:00-16:	15	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), ln			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Le	ngth (LA),	ft	1500	640		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	ed One-Lane	
Adjustment Factors			•			
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Seve	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Capacity Adjustment Factor for CAVs,	, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	.F)		1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi), veh/h			2870	1080		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			10.00	6.00	6.00	
Heavy Vehicle Adjustment Factor (fHV	/)		0.909	0.943	0.943	
Flow Rate (vi), pc/h			3359	1218	1218	
Capacity (cmd), pc/h			7200	2200	2200	
Adjusted Capacity (cmda), pc/h			7200	2200	2200	
Volume-to-Capacity Ratio (v/c)			0.64	0.55	0.55	
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft	1738.2	Flow Outer Lanes (vOA), pc/h/	In	1360	
Downstream Equilibrium Distance (Le	Q), ft	-	On-Ramp Influence Area Spee	ed (SR), mi/h	60.3	
Flow in Lanes 1 and 2 (v12), pc/h		1999	Outer Lanes Freeway Speed (S	50), mi/h	66.9	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	3217	Ramp Junction Speed (S), mi/h   62.1		62.1	
Number of Outer Lanes on Freeway (	NO), In	1	Average Density (D), pc/mi/ln		24.6	
Level of Service (LOS)		С	Density in Ramp Influence Are	ea (DR), pc/mi/ln	26.1	

HCS Basic Freeway Report					
Project Information					
Segment Number	13	Segment Name	I-90 east of SR-611		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	3230	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	3950	Heavy Vehicle Adjustment Factor (fHV)	0.901		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1555		
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.65		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.5		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.7		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Copyright © 2023 University of Florida. All Rights Reserved.

HCS T Freeways Version 2023 I-90 EB 2045 PM - OPTION 2 AND 3.xuf

### HCS Basic Freeway Report

#### **Project Information**

Project Information			
Analyst	GSH	Date	2/17/2023
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Geometric Data			
Number of Lanes (N), In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	2360	Heavy Vehicle Adjustment Factor (fHV)	0.775
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1620
Total Trucks, %	29.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.68
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	23.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		
Copyright © 2023 University of Florida. All Rights	Reserved. HCSTM Freewa	ays Version 2023	Generated: 08/25/2023 11:46:1

Copyright © 2023 University of Florida. All Rights Reserved.

HCS TM Freeways Version 2023 I-90 EB W of SR2 Basic 2045 AM - BUILD.xuf Generated: 08/25/2023 11:46:13

### HCS Basic Freeway Report

#### **Project Information**

Project Information			
Analyst	GSH	Date	2/17/2023
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Geometric Data			
Number of Lanes (N), In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	1360	Heavy Vehicle Adjustment Factor (fHV)	0.775
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	934
Total Trucks, %	29.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.39
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	13.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		
Copyright © 2023 University of Florida. All Rights	Reserved. HCSTM Freewa	ays Version 2023	Generated: 08/25/2023 11:44:1

Copyright © 2023 University of Florida. All Rights Reserved.

HCS M Freeways Version 2023 I-90 EB W of SR2 Basic 2045 PM - BUILD.xuf Generated: 08/25/2023 11:44:15

### HCS Freeway Facilities Report

### **Project Information**

Analyst	GSH	Date	2/17/2023
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Facility Name	I-90 WB OPTION 2	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

#### Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	13
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	8.99		

### Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-90 east of SR-611	3860	3
2	Diverge	Diverge	I-90 Exit Ramp to SR-611	1500	3
3	Basic	Basic	I-90 below SR-611 (3-lane section)	2310	3
4	Merge	Merge	I-90 Entrance Ramp from SR-611	1500	3
5	Basic	Basic	I-90 b/w SR-611 and SR-254	11410	3
6	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	3
7	Basic	Basic	I-90 below SR-254	2790	3
8	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	3
9	Basic	Basic	I-90 b/w SR-254 and SR-57	6450	3
10	Diverge	Diverge	I-90 Exit Ramp to SR-57	1500	3
11	Basic	Basic	I-90 below SR-57	2870	3
12	Weaving	Weaving	I-90 b/w SR-57 and SR-2 Weave	5300	3
13	Basic	Basic	SR-2 West of I-90/SR-2 Diverge	5000	2

#### Facility Segment Data

							Segme	nt 1: Ba	asic						
АР	Pł	HF	fŀ	łV	Flow (pc/		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	926	338	39	720	00	0.4	47	7(	).0	16	5.1	В
Segment 2: Diverge															
АР	Pł	HF	fŀ	łV	Flow Rate (pc/h)Capacity (pc/h)d/c RatioSpeed (mi/h)			Density L (pc/mi/ln)		LOS					
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.971	3389	844	7200	2200	0.47	0.38	66.4	63.2	17.0	20.2	С
Segment 3: Basic															
АР	Pł	HF	fŀ	IV	Flow (pc,		Capa (pc,	-		/c tio		eed i/h)		nsity ni/ln)	LOS

1	0.9	94	0.9	26	250	)4	720	00	0.	35	69	9.8	11	1.9	В
							Segmer		<u> </u>						
АР	Pł	łF	fH	IV	Flow (pc/		Capa (pc/	city	d, Ra			eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.952	3029	525	7200	2200	0.42	0.24	64.3	62.6	15.7	16.2	В
							Segme	nt 5: Ba	asic						
AP	Pł	łF	fH	IV	Flow (pc/		Capa (pc/		d, Ra		Spo (mi			nsity ni/ln)	LOS
1	0.9	94	0.9	01	312		720		0.4	43	70	).0	14	4.9	В
							Segmen								
АР	Pł	łF	f⊦		Flow (pc/		Capa (pc/		d/c Speed Ratio (mi/h)				Der (pc/n	nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.980	3129	619	7200	2200	0.43	0.28	66.9	63.7	15.6	19.2	В
							Segment 7: Basic						-		
AP	Pł	łF	fH	IV	Flow (pc/		Capa (pc/		-	d/c Speed Ratio (mi/h)			nsity ni/ln)	LOS	
1	0.9	94	0.9	01	245	56	720	00	0.34 69.9		9.9	11.7		В	
					Segment 8: Merge										
АР	Pł	łF	f⊦	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F R Infl.		F	R Infl.	
1	0.94	0.94	0.901	0.962	2898	442	7200	2200	0.40	0.20	64.6	62.8	15.0	15.1	В
							Segme	nt 9: Ba	asic						
AP	Pł	4F	fH	IV	Flow (pc/		Capa (pc/		d/c Speed Ratio (mi/h)		Density (pc/mi/ln)		LOS		
1	0.9	94	0.9	26	284	49	720	00	0.40 70.0		13.6		В		
						5	Segment	10: Div	verge						
АР	Pł	łF	fH	IV	Flow (pc,		Capa (pc/		d/c Speed Ratio (mi/h)			nsity ni/ln)	LOS		
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.962	2849	531	7200	2200	0.40	0.24	67.1	64.0	14.2	17.7	В
Segment 11: Basic															
АР	Pł	łF	fH	IV	Flow (pc,		Capa (pc/		d/c Speed Ratio (mi/h)			nsity ni/ln)	LOS		
1	0.9	94	0.9	26	229	98	720	00	0.32 69.9		10	).9	A		
						S	egment	12: We	aving						
AP	Pł	łF	fH	IV	Flow (pc,		Capa (pc/			d/c Speed Ratio (mi/h)			Density (pc/mi/ln)		LOS
1	0.9	94	0.9	09	340	05	683	37	0.	50	64	1.1	17	7.7	В
							Segmer	nt 13: B	asic						
AP	Pł	łF	fH	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS

1	0.94	0.943	2629	4800	)	0.55	69.8			18.8	C		
Fac	Facility Analysis Results												
АР	veh-mi/AP veh-mi/AP veh-h/AP \$/AP mi/h pc/mi/ĺn veh/mi/ln min												
1         6096         5443         1.96         49.02         68.5         14.9         13.6         7.90									В				
Facility Overall Results													
Spac	e Mean Speed,	mi/h	68.5		Averag	e Density, ve	h/mi/ln	13.6	5				
Aver	age Travel Time	, min	7.90		Averag	e Density, po	:/mi/ln	14.9	)				
Total VMT, veh-mi 6096 Total VHD, veh-h								1.96	5				
Vehicle Value of Time (VOT), \$/h         25.00         Total Delay Cost, \$         49.02						)2							
Copyri	ght © 2023 Univer	sity of Florida. All Ri	ghts Reserved.	HCS 🖚 Freewa	ys Versior	2023			Genera	ted: 08/25/2	023 10:40:25		

HCS M Freeways Version 2023 I-90 WB 2045 AM - OPTION 2.xuf

AP1         B         C         B         A         B							LOS						
Seg 13         Seg 13         Seg 1         Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 13           AP 1         700         664         693         643         700         669         699         648         700         67.1         699         641           Seg 13         Seg 13         Seg 13         Seg 13         700         66.9         699         648         700         67.1         699         641           Seg 13         Seg 13         Seg 13         Seg 14         Seg 15         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 13           AP 1         161         17.0         11.9         15.7         14.9         15.6         11.7         15.0         13.6         14.2         0.9         17.7           Seg 13         Seg 1         Seg 13         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 10         Seg 11         Seg 13         Seg 1         Seg 11         Seg 11		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1       C         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11         AP 1       700       66.4       69.8       64.3       700       66.9       69.9       Sed 6       700       67.1       69.9       64.1         Seg 13       Seg 13       Seg 13       Seg 13       Seg 13       Seg 14       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 13         AP 1       69.8       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 13         AP 1       16.1       17.0       11.9       15.6       11.7       15.0       13.6       14.2       10.9       17.7         Seg 13       Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 1         AP 1       0.47       0.35       0.42       0.43       0.43       0.40       0.40       0.40       0.32       0.50         Seg 13 <t< th=""><th>AP 1</th><th>В</th><th>С</th><th>В</th><th>В</th><th>В</th><th>В</th><th>В</th><th>В</th><th>В</th><th>В</th><th>А</th><th>В</th></t<>	AP 1	В	С	В	В	В	В	В	В	В	В	А	В
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11           AP 1         700         664         608         643         700         669         646         700         671         693         641           Seg 13         Seg 11         Seg 11         Seg 11         Seg 11         Seg 11         Seg 11         Seg 13         Seg 11         Seg 13		Seg 13											
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11           AP 1         700         66.4         69.8         64.3         70.0         66.9         69.9         64.6         70.0         67.1         69.9         64.1           Seg 13         Seg 13            69.9         64.6         70.0         67.1         69.9         64.1           G 93          Seg 13         Seg 13         Seg 1         Seg 13         Seg 1         Seg 1 <t< th=""><th>AP 1</th><th>С</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>	AP 1	С											
AP 1         700         66.4         69.8         64.3         700         66.9         69.9         64.6         700         67.1         69.9         64.1           Seg 13         AP 1         69.8         69.8         64.3         70.0         66.9         69.9         64.6         70.0         67.1         69.9         64.1           AP 1         69.8         69.8         Seg 13         5         5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11         Seg 1						S	peed (mi	/h)					
Seg 13         Seg 13           AP 1         69.8           KAP 1         69.8           Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 1           AP 1         16.1         17.0         11.9         15.7         14.9         15.6         11.7         15.0         13.6         14.2         10.9         17.7           Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 13           AP 1         18.8           Seg 13         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 13           AP 1         0.47         0.35         0.42         0.43         0.43         0.44         0.40         0.40         0.40         0.32         0.50           Seg 13         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7 <th></th> <th>Seg 1</th> <th>Seg 2</th> <th>Seg 3</th> <th>Seg 4</th> <th>Seg 5</th> <th>Seg 6</th> <th>Seg 7</th> <th>Seg 8</th> <th>Seg 9</th> <th>Seg 10</th> <th>Seg 11</th> <th>Seg 12</th>		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1         698           Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11 <thseg 11<="" th=""> <thseg 11<="" th="">         Seg</thseg></thseg>	AP 1	70.0	66.4	69.8	64.3	70.0	66.9	69.9	64.6	70.0	67.1	69.9	64.1
Seg1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11           AP 1         16.1         17.0         11.9         15.7         14.9         15.6         11.7         15.0         13.6         14.2         10.9         17.7           Seg 13         Seg 14         18.8         Seg 14         Seg 15         Seg 15         Seg 17         Seg 8         Seg 9         Seg 10         Seg 11         Seg 17           AP 1         18.8         Seg 1         Seg 1         Seg 13         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 1           AP 1         0.47         0.47         0.35         0.42         0.43         0.43         0.40		Seg 13											
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11           AP 1         16.1         17.0         11.9         15.7         14.9         15.6         11.7         15.0         13.6         14.2         10.9         17.7           Seg 13         Seg 1         16.0         11.7         15.0         13.6         14.2         10.9         17.7           Seg 13         Seg 13         Seg 1         Seg 1         Seg 13         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11           AP 1         0.47         0.47         0.35         0.42         0.43         0.43         0.40<	AP 1	69.8											
AP 1       16.1       17.0       11.9       15.7       14.9       15.6       11.7       15.0       13.6       14.2       10.9       17.7         Seg 13       Seg 13       Seg 13       Seg 13       Seg 13       Seg 1       18.8       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11         AP 1       0.47       0.47       0.35       0.42       0.43       0.43       0.40       0.40       0.40       0.32       0.50         Seg 13       Seg 13       Seg 13       Seg 13       Seg 13       Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 13         AP 1       0.55       Seg 13       Seg 1       Seg 11       Seg 11       Seg 11       Seg 11       Seg 11       Seg 1       Seg 1       Seg 1       Seg 1       Seg 1       Seg 1       Seg 1 <th></th> <th colspan="9">Density (pc/mi/ln)</th>		Density (pc/mi/ln)											
Seg 13       AP 1       18.8         Demand - Capacity Ratio (D/C)         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11       Seg 11         AP 1       0.47       0.47       0.35       0.42       0.43       0.43       0.40       0.40       0.40       0.40       0.32       0.50         Seg 13       Seg 13       Seg 13       Seg 13       0.42       0.43       0.43       0.40       0.40       0.40       0.32       0.50         AP 1       0.55       Seg 13       Seg 13       0.42       0.43       0.43       0.40       0.40       0.40       0.32       0.50         AP 1       0.55       Seg 13       Seg 13       Seg 13       Seg 14       Seg 15       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11       Seg 13         AP 1       15.7       11.0       14.5       13.4       14.1       10.5       13.5       12.6       13.1       10.1       15.1         AP 1       Trice         AP 1       Trice       Trice		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1       18.8         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11         AP 1       0.47       0.47       0.35       0.42       0.43       0.43       0.44       0.40       0.40       0.32       0.50         AP 1       0.47       0.47       0.35       0.42       0.43       0.43       0.40       0.40       0.40       0.32       0.50         AP 1       0.55	AP 1	16.1	17.0	11.9	15.7	14.9	15.6	11.7	15.0	13.6	14.2	10.9	17.7
Demand - Capacity Ratio (D/C)AP 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11AP 10.470.470.350.420.430.430.340.400.400.400.320.50Seg 13Seg 13Seg 13Seg 13Seg 14Seg 15Seg 15Seg 15Seg 160.400.400.400.320.50AP 10.55Seg 13Seg 1Seg 13Seg 1Seg 15Seg 1Seg 13Seg 1Seg 13AP 114.9Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11AP 114.915.711.014.513.414.110.513.512.613.110.115.1AP 117.7Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 14AP 117.7Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11Seg 11AP 1-Seg 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11AP 1-Seg 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11AP 1-Seg 1Seg 3Seg 4Seg 5		Seg 13											
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11           AP 1         0.47         0.47         0.35         0.42         0.43         0.43         0.40         0.40         0.40         0.40         0.32         0.50           Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         0.47         0.55         Seg 1         Seg 1         0.40         0.40         0.40         0.32         0.50           AP 1         0.55         Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 1	AP 1	18.8											
AP 1         0.47         0.47         0.35         0.42         0.43         0.43         0.34         0.40           AP 1         0.55         Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11           AP 1         1.7.         1.62         1.9.2         1.5.1         1.7.7         1.0.					D	emand -	Capacity	Ratio (D	/C)				
Seg 13         AP 1         0.55           AP 1         0.55           Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11           AP 1         1.7.7         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11           AP 1         .         .         .         .         . <th></th> <th>Seg 1</th> <th>Seg 2</th> <th>Seg 3</th> <th>Seg 4</th> <th>Seg 5</th> <th>Seg 6</th> <th>Seg 7</th> <th>Seg 8</th> <th>Seg 9</th> <th>Seg 10</th> <th>Seg 11</th> <th>Seg 12</th>		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1       0.55         AP 1       0.55         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 13         AP 1       14.9       15.7       11.0       14.5       13.4       14.1       10.5       13.5       12.6       13.1       10.1       15.1         Seg 13       Seg 13       Seg 13       Seg 15       Seg 15       Seg 15       Seg 15       Seg 15       Seg 16       Seg 17       Seg 17       Seg 13       Seg 16       Seg 17       Se	AP 1	0.47	0.47	0.35	0.42	0.43	0.43	0.34	0.40	0.40	0.40	0.32	0.50
Density (veh/mi/ln)Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11AP 114.915.711.014.513.414.110.513.512.613.110.115.1Seg 13Seg 13Seg 717.7Seg 14Seg 14Seg 14Seg 1410.513.512.613.110.115.1AP 117.7Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 14AP 120.216.216.219.215.115.117.717.711		Seg 13											
Seg1         Seg2         Seg3         Seg4         Seg5         Seg6         Seg7         Seg8         Seg9         Seg10         Seg11         Seg11         Seg11         Seg11         11.0         14.5         13.4         14.1         10.5         13.5         12.6         13.1         10.1         15.7           AP 1         14.9         15.7         11.0         14.5         13.4         14.1         10.5         13.5         12.6         13.1         10.1         15.7           AP 1         17.7	AP 1	0.55											
AP 1         14.9         15.7         11.0         14.5         13.4         14.1         10.5         13.5         12.6         13.1         10.1         15.1           AP 1         14.9         15.7         11.0         14.5         13.4         14.1         10.5         13.5         12.6         13.1         10.1         15.1           AP 1         17.7         -													
Xiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1       17.7         Beg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11<	AP 1		15.7	11.0	14.5	13.4	14.1	10.5	13.5	12.6	13.1	10.1	15.1
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11		-											
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11	AP 1	17.7											
AP 1         -         20.2         -         16.2         -         19.2         -         15.1         -         17.7         -         -					Density	in Ramp	Influenc	e Area (p	c/mi/ln)				
		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
Seg 13	AP 1	-	20.2	-	16.2	-	19.2	-	15.1	-	17.7	-	-
		Seg 13											
AP 1 -	AP 1	-											
Density-Based LOS		Density-Based LOS											
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 1		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1         B         C         B         B         B         B         B         B         B         A         B	AP 1		С	В	В	В	В	В	В	В	В	А	В
Seg 13		_											
AP 1 C	AP 1	С											
Demand-Based LOS						Dem	and-Base	d LOS					
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 1		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP1	AP 1	-	-	-	-	-	-	-	-	-	-	-	-
Seg 13		Seg 13											

AP 1	-											
				V	olume - O	Capacity	Ratio (V/	<b>C</b> )				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.47	0.47	0.35	0.42	0.43	0.43	0.34	0.40	0.40	0.40	0.32	0.50
	Seg 13											
AP 1	0.55											

# HCS Basic Freeway Report

Project Information			
Analyst	GSH	Date	2/17/2023
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	I-90 east of SR-611
Analysis Period Number	1	Segment Analysis Period	08:00-08:15
Geometric Data			
Number of Lanes (N), In	3	Terrain Type	Level
Segment Length (L), ft	3860	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	2950	Heavy Vehicle Adjustment Factor (fHV)	0.926
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1130
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.47
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

Project information							
Segment Number 2			Segment Name	I-90 Exit R	amp to SR-611		
Analysis Period Number 1			Segment Analysis Period	08:00-08:1	5		
Geometric Data							
			Freeway	Ramp	np         o)         el         nt-Sided One-Lane         =amiliar         n-Severe Weather         00         00         00         00         01         02         03         04         05         06         07         08         09         00		
Number of Lanes (N), In			3	1			
Free-Flow Speed (FFS), mi/h			70.0	55.0			
Segment Length (L) / Deceleration Length (LD), ft		ft	1500	580			
Terrain Type			Level	Level			
Percent Grade, %			-	-			
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane		
Adjustment Factors							
Driver Population	All Familiar All Familiar		r				
Neather Type No		Non-Severe Weather	Non-Sever	re Weather			
Incident Type			No Incident	-			
Proportion of CAVs in Traffic Stream			0	-			
Final Speed Adjustment Factor (SAF)			1.000	1.000			
Demand Adjustment Factor (DAF)			1.000	1.000			
Capacity Adjustment Factor for CAVs, CAFCAV			1.000	-			
Final Capacity Adjustment Factor (CAF)			1.000	1.000			
Demand and Capacity							
Demand Volume (Vi), veh/h			2950	770			
Peak Hour Factor (PHF)			0.94	0.94			
Total Trucks, %			8.00	3.00			
Heavy Vehicle Adjustment Factor (fHV	/)		0.926	0.971			
Flow Rate (vi), pc/h			3389	844			
Capacity (cmd), pc/h			7200	2200			
Initial Adjusted Capacity (cmda), pc/h			7200	-			
Final Adjusted Capacity (cmda), pc/h			7200	2200			
Volume-to-Capacity Ratio (v/c)			0.47	0.47 0.38			
Speed and Density							
Upstream Equilibrium Distance (LEQ),	ft	-	Flow Outer Lanes (vOA), pc/h/ln	1	926		
Downstream Equilibrium Distance (LE	Q), ft	-	Off-Ramp Influence Area Speed	d (SR), mi/h	63.2		
Flow in Lanes 1 and 2 (v12), pc/h		2463	Outer Lanes Freeway Speed (Sc	), mi/h	76.8		
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h		66.4		
Number of Outer Lanes on Freeway (	NO), In	1	Average Density (D), pc/mi/ln		17.0		
Level of Service (LOS)		С	Density in Ramp Influence Area	Average Density (D), pc/mi/ln     17.0       Density in Ramp Influence Area (DR), pc/mi/ln     20.2			
			-		-		

HCS Basic Freeway Report							
Project Information							
Segment Number	3	Segment Name	I-90 below SR-611 (3-lane section)				
Analysis Period Number	1	Segment Analysis Period	08:00-08:15				
Geometric Data							
Number of Lanes (N), In	3	Terrain Type	Level				
Segment Length (L), ft	2310	Percent Grade, %	-				
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-				
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83				
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0				
Right-Side Lateral Clearance, ft	-						
Adjustment Factors							
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000				
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000				
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000				
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000				
Demand and Capacity							
Demand Volume (V), veh/h	2180	Heavy Vehicle Adjustment Factor (fHV)	0.926				
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	835				
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400				
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400				
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400				
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.35				
Speed and Density							
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.8				
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	11.9				
Total Ramp Density Adjustment	-	Level of Service (LOS)	В				
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0						

roject mormation						
Segment Number 4			Segment Name	I-90 Entrar	nce Ramp from SR-611	
Analysis Period Number 1			Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Leng	gth (LA), ft		1500	790		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000		
Demand Adjustment Factor (DAF)		1.000	1.000			
Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-			
Final Capacity Adjustment Factor (CAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2180	470		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			8.00	5.00	5.00	
Heavy Vehicle Adjustment Factor (fHV)			0.926	0.952	0.952	
Flow Rate (vi), pc/h			2504	525	525	
Capacity (cmd), pc/h			7200	2200	2200	
Adjusted Capacity (cmda), pc/h			7200	2200	2200	
Volume-to-Capacity Ratio (v/c)			0.42	0.24	0.24	
Speed and Density						
Upstream Equilibrium Distance (LEQ), ft	1	473.6	Flow Outer Lanes (vOA), pc/h/ln		1002	
Downstream Equilibrium Distance (LEQ)	Downstream Equilibrium Distance (LEQ), ft 3188.6		On-Ramp Influence Area Speed	(SR), mi/h	62.6	
Flow in Lanes 1 and 2 (v12), pc/h 1502		Outer Lanes Freeway Speed (SO), mi/h 68.2		60.0		
Flow Entering Ramp-Infl. Area (vR12), pc/h 2027		502	Outer Lanes Freeway Speed (So	), mi/h	68.2	
Flow Entering Ramp-Infl. Area (vR12), pc			Outer Lanes Freeway Speed (SO Ramp Junction Speed (S), mi/h	), mi/h	68.2 64.3	
Flow Entering Ramp-Infl. Area (vR12), po Number of Outer Lanes on Freeway (No	c/h 2	2027		), mi/h		

HCS Basic Freeway Report							
Project Information							
Segment Number	5	Segment Name	I-90 b/w SR-611 and SR-254				
Analysis Period Number	1	Segment Analysis Period	08:00-08:15				
Geometric Data							
Number of Lanes (N), In	3	Terrain Type	Level				
Segment Length (L), ft	11410	Percent Grade, %	-				
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-				
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83				
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0				
Right-Side Lateral Clearance, ft	-						
Adjustment Factors							
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000				
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000				
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000				
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000				
Demand and Capacity							
Demand Volume (V), veh/h	2650	Heavy Vehicle Adjustment Factor (fHV)	0.901				
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1043				
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400				
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400				
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400				
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.43				
Speed and Density							
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0				
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	14.9				
Total Ramp Density Adjustment	-	Level of Service (LOS)	В				
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0						

Project information						
Segment Number 6	5		Segment Name	I-90 Exit R	amp to SR-254	
Analysis Period Number 1	1		Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD),	, ft	1500	500		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			•			
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000		
Demand Adjustment Factor (DAF)		1.000	1.000			
Capacity Adjustment Factor for CAVs, CAFcAv		1.000	-			
Final Capacity Adjustment Factor (CA	νF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2650	570		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			11.00	2.00		
Heavy Vehicle Adjustment Factor (fH	V)		0.901	0.980	0.980	
Flow Rate (vi), pc/h			3129	619		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h			7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.43	0.28		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	, ft	5473.1	Flow Outer Lanes (vOA), pc/h/ln		871	
Downstream Equilibrium Distance (Le	EQ), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	63.7	
Flow in Lanes 1 and 2 (v12), pc/h		2258	Outer Lanes Freeway Speed (SO	), mi/h	76.8	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h		66.9	
Number of Outer Lanes on Freeway (	(No), In	1	Average Density (D), pc/mi/ln		15.6	
Level of Service (LOS)		В	Density in Ramp Influence Area	(DR), pc/mi/ln	19.2	
			B		8	

HCS Basic Freeway Report							
Project Information							
Segment Number	7	Segment Name	I-90 below SR-254				
Analysis Period Number	1	Segment Analysis Period	08:00-08:15				
Geometric Data							
Number of Lanes (N), In	3	Terrain Type	Level				
Segment Length (L), ft	2790	Percent Grade, %	-				
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-				
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83				
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0				
Right-Side Lateral Clearance, ft	-						
Adjustment Factors							
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000				
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000				
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000				
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000				
Demand and Capacity							
Demand Volume (V), veh/h	2080	Heavy Vehicle Adjustment Factor (fHV)	0.901				
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	819				
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400				
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400				
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400				
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.34				
Speed and Density							
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9				
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	11.7				
Total Ramp Density Adjustment	-	Level of Service (LOS)	В				
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0						

Project mormation						
Segment Number 8			Segment Name	I-90 Entrai	nce Ramp from SR-254	
Analysis Period Number 1			Segment Analysis Period	08:00-08:1	5	
Geometric Data			•			
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Le	ngth (LA), ft		1500	830		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			-			
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000		
Demand Adjustment Factor (DAF)		1.000	1.000			
Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-			
Final Capacity Adjustment Factor (CAI	F)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2080	400		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			11.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (fHV	)		0.901	0.962	0.962	
Flow Rate (vi), pc/h			2456	442		
Capacity (cmd), pc/h			7200	2200	2200	
Adjusted Capacity (cmda), pc/h			7200	2200	2200	
Volume-to-Capacity Ratio (v/c)			0.40	0.20	0.20	
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft 1463	3.3	Flow Outer Lanes (vOA), pc/	h/ln	980	
Downstream Equilibrium Distance (LE	Q), ft 2676	5.3	On-Ramp Influence Area Sp	peed (SR), mi/h	62.8	
Flow in Lanes 1 and 2 (v12), pc/h	1470	5	Outer Lanes Freeway Speed	l (So), mi/h	68.3	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 1918	3	Ramp Junction Speed (S), m	ni/h	64.6	
Number of Outer Lanes on Freeway (I	NO), In 1		Average Density (D), pc/mi/	′ln	15.0	
Level of Service (LOS)	В		Density in Ramp Influence A	Area (DR), pc/mi/ln	15.1	

HCS Basic Freeway Report Project Information							
							Segment Number
Analysis Period Number	1	Segment Analysis Period	08:00-08:15				
Geometric Data							
Number of Lanes (N), In	3	Terrain Type	Level				
Segment Length (L), ft	6450	Percent Grade, %	-				
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-				
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83				
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0				
Right-Side Lateral Clearance, ft	-						
Adjustment Factors							
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000				
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000				
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000				
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000				
Demand and Capacity							
Demand Volume (V), veh/h	2480	Heavy Vehicle Adjustment Factor (fHV)	0.926				
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	950				
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400				
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400				
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (Cadj), pc/h/ln	2400				
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.40				
Speed and Density							
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0				
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	13.6				
Total Ramp Density Adjustment	-	Level of Service (LOS)	В				
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0						

Project information						
Segment Number	10		Segment Name	I-90 Exit R	amp to SR-57	
Analysis Period Number	1		Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration L	.ength (LD),	, ft	1500	480		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000		
Demand Adjustment Factor (DAF)		1.000	1.000			
Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-			
Final Capacity Adjustment Factor (CA	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2480	480		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			8.00	4.00		
Heavy Vehicle Adjustment Factor (fH	IV)		0.926	0.962	0.962	
Flow Rate (vi), pc/h			2849	531		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h	า		7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.40	0.24	0.24	
Speed and Density						
Upstream Equilibrium Distance (LEQ)	), ft	4606.4	Flow Outer Lanes (vOA), pc/h/ln		779	
Downstream Equilibrium Distance (L	EQ), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	64.0	
Flow in Lanes 1 and 2 (v12), pc/h		2070	Outer Lanes Freeway Speed (SO)	), mi/h	76.8	
Flow Entering Ramp-Infl. Area (vR12)	, pc/h	-	Ramp Junction Speed (S), mi/h		67.1	
Number of Outer Lanes on Freeway	(No), In	1	Average Density (D), pc/mi/ln		14.2	
Level of Service (LOS)		В	Density in Ramp Influence Area	(DR), pc/mi/ln	17.7	
		•			-	

HCS Basic Freeway Report							
Project Information							
Segment Number	11	Segment Name	I-90 below SR-57				
Analysis Period Number	1	Segment Analysis Period	08:00-08:15				
Geometric Data							
Number of Lanes (N), In	3	Terrain Type	Level				
Segment Length (L), ft	2870	Percent Grade, %	-				
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-				
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.17				
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0				
Right-Side Lateral Clearance, ft	-						
Adjustment Factors	•	•					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000				
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000				
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000				
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000				
Demand and Capacity							
Demand Volume (V), veh/h	2000	Heavy Vehicle Adjustment Factor (fHV)	0.926				
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	766				
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400				
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400				
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400				
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.32				
Speed and Density							
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9				
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	10.9				
Total Ramp Density Adjustment	-	Level of Service (LOS)	A				
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0						

		HCS Freeway	y V	Veaving Repo	ort	
Project Information						
Segment Number		12		Segment Name		I-90 b/w SR-57 and SR-2 Weave
Analysis Period Number		1		Segment Analysis Pe	riod	08:00-08:15
Geometric Data						
Number of Lanes (N), In		3		Segment Type		Freeway
Segment Length (Ls), ft		4300		Number of Maneuve	r Lanes (NwL), In	0
Weaving Configuration		Two-Sided		Ramp-to-Freeway La	ne Changes (LCRF), lc	1
Terrain Type		Level		Freeway-to-Ramp La	ne Changes (LCFR), lc	1
Percent Grade, %		-		Ramp-to-Ramp Lane	Changes (LCRR), lc	1
Interchange Density (ID), int/mi		0.67		Cross Weaving Mana	ged Lane	No
Adjustment Factors				- -		- -
Driver Population	_	All Familiar	_	Final Speed Adjustme	ent Factor (SAF)	1.000
Weather Type		Non-Severe Weather		Demand Adjustment Factor (DAF)		1.000
ncident Type		No Incident		Capacity Adjustment Factor for CAVs, CAFCAV		1.000
Proportion of CAVs in Traffic Stream		0	Final Capacity Adjustment Factor (CAF)		ment Factor (CAF)	1.000
Demand and Capacity				•		•
		FF		RF	RR	FR
Demand Volume (Vi), veh/h	14	70	86	0	50	530
Peak Hour Factor (PHF)	0.9	)4	0.9	4	0.94	0.94
Total Trucks, %	10	.00	10.	00	10.00	10.00
Heavy Vehicle Adjustment Factor (fHV)	0.9	909	0.9	09	0.909	0.909
Flow Rate (vi), pc/h	17	20	10	06	59	620
Weaving Flow Rate (vw), pc/h	59		lde	eal Conditions Capacity	/ (cIFL), pc/h/ln	2400
Non-Weaving Flow Rate (vNW), pc/h	33	46	De	nsity-Based Capacity (	cIWL × N × fHV), veh/h	6215
Total Flow Rate (v), pc/h	34	05	De	mand Flow-Based Cap	-	
Volume Ratio (VR)	0.0	)17	We	Weaving Area Capacity (cW), veh/h		6215
Minimum Lane Change Rate (LCMIN), lc/h	59		Ad	Adjusted Weaving Area Capacity (cWA), veh/h		6215
Maximum Weaving Length (LMAX), ft	58	85	Volume-to-Capacity Ratio (v/c)		0.50	
Speed and Density						
Non-Weaving Vehicle Index (INW)		964		Average Weaving Speed (Sw), mi/h		62.3
Non-Weaving Lane Change Rate (LCNW), lc	/h	2435		Average Non-Weavir	Average Non-Weaving Speed (SNW), mi/h	
Weaving Lane Change Rate (LCw), lc/h		394		Average Speed (S), m	ni/h	64.1
Weaving Lane Change Rate (LCAII), lc/h		2829		Density (D), pc/mi/ln		17.7
Weaving Intensity Factor (W)		0.162		Level of Service (LOS	)	В

	HCS Basic F	Freeway Report				
Project Information						
Segment Number	13	Segment Name	SR-2 West of I-90/SR-2 Diverge			
Analysis Period Number	1	Segment Analysis Period	08:00-08:15			
Geometric Data						
Number of Lanes (N), In	2	Terrain Type	Level			
Segment Length (L), ft	5000	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors						
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	2330	Heavy Vehicle Adjustment Factor (fHV)	0.943			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1314			
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.55			
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.8			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.8			
Total Ramp Density Adjustment	-	Level of Service (LOS)	С			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

HCSTM Freeways version 2023 I-90 WB 2045 AM - OPTION 2.xuf

### HCS Freeway Facilities Report

### **Project Information**

Analyst	GSH	Date	2/17/2023
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Facility Name	I-90 WB OPTION 2	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

### Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	13
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	8.99		

### Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-90 east of SR-611	3860	3
2	Diverge	Diverge	I-90 Exit Ramp to SR-611	1500	3
3	Basic	Basic	I-90 below SR-611 (3-lane section)	2310	3
4	Merge	Merge	I-90 Entrance Ramp from SR-611	1500	3
5	Basic	Basic	I-90 b/w SR-611 and SR-254	11410	3
6	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	3
7	Basic	Basic	I-90 below SR-254	2790	3
8	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	3
9	Basic	Basic	I-90 b/w SR-254 and SR-57	6450	3
10	Diverge	Diverge	I-90 Exit Ramp to SR-57	1500	3
11	Basic	Basic	I-90 below SR-57	2870	3
12	Weaving	Weaving	I-90 b/w SR-57 and SR-2 Weave	5300	3
13	Basic	Basic	SR-2 West of I-90/SR-2 Diverge	5000	2

### Facility Segment Data

	Segment 1: Basic														
АР	AP PHF fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS		
1	1 0.94 0.926		926	596	5963		7200		0.83		62.8		31.7		
Segment 2: Diverge															
АР	AP PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.971	5963	1578	7200	2200	0.83	0.72	64.8	61.3	30.7	32.9	D
Segment 3: Basic															
АР	AP PHF		fŀ	IV	Flow (pc,		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS

1	0.9	94	0.9	26	430	)8	720	00	0.	60	69	9.4	20.7		С
			Ś				Segmer	nt 4: Me	erge						
АР	Pł	PHF fHV		Flow Rate (pc/h)			Capacity (pc/h)		/c tio		eed i/h)	Density (pc/mi/ln)		LOS	
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.952	5191	883	7200	2200	0.72	0.40	61.7	59.9	28.0	27.2	С
							Segme	nt 5: Ba	asic						
AP	Pł	łF	fŀ	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	01	536	50	720	00	0.	74	66	5.0	27	7.1	D
Segment 6: Diverge															
AP	Pł	łF	f⊦	IV	Flow (pc/		Capa (pc/		-	/c Speed tio (mi/h)			Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.980	5360	1270	7200	2200	0.74	0.58	65.5	62.1	27.3	30.7	D
							Segme	nt 7: Ba	asic						
AP	Pł	łF	f⊦	IV	Flow Rate (pc/h)		Capa (pc/		d/c Ratio		Speed (mi/h)			nsity ni/ln)	LOS
1	0.9	94	0.9	01	397	79	720	00	0.	55	69	9.8	19.0		С
							Segmer	nt 8: Me	erge						
AP	PHF		fHV		Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.962	4764	785	7200	2200	0.66	0.36	62.6	61.0	25.4	24.8	C
							Segme	nt 9: Ba	asic						
АР	Pł	łF	f⊦	IV	Flow (pc/		Capacity (pc/h)		d/c Speed Ratio (mi/h)			Density (pc/mi/ln)		LOS	
1	0.9	94	0.9	26	468	37	720	65	68.5 22.8				C		
						5	Segment	10: Div	/erge						
АР	Pł	łF	f⊦	IV	Flow (pc,		Capa (pc/		d, Ra			Speed (mi/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.962	4687	863	7200	2200	0.65	0.39	66.5	63.1	23.5	27.2	C
							Segmer	nt 11: B	asic						
АР	PHF 1		f⊦	IV	Flow Rate (pc/h)		Capacity (pc/h)		d/c Ratio		Speed (mi/h)			nsity ni/ln)	LOS
1 0.94 0.926 3791				91	720	00	0.	53	69	9.9	18	3.1	C		
						S	egment	12: We	aving						
AP	P PHF fHV Flow Rate (pc/h)			Capacity (pc/h)		d/c Ratio		Speed (mi/h)			nsity ni/ln)	LOS			
1	0.9	94	0.9	09	528	39	683	31	0.	77	60	).8	29	9.0	D
							Segmer	nt 13: B	asic						
AP PHF fi		fŀ	IV	Flow (pc/		Capa (pc/		d/c Ratio		Speed (mi/h)		Density (pc/mi/ln)		LOS	

1	0.94	0.943	3858	4800		0.80	63.8		30.2		D		
Fac	Facility Analysis Results												
АР	VMT veh-mi/AP	VMT-Demano veh-mi/AP	VHD Total Delay C veh-h/AP \$/AP		ost Speed mi/h		Density pc/mi/ln	Den: veh/r	,	TT min	LOS		
1	10088	9075	10.40	260.06		65.3	25.9	23	.6	8.30	С		
Fac	ility Overal	l Results											
Spac	e Mean Speed,	mi/h	65.3	Average Density, veh,			eh/mi/ln	n/mi/ln 23.6					
Average Travel Time, min			8.30	8.30			Average Density, pc/mi/ln				25.9		
Total VMT, veh-mi			10088	10088			Total VHD, veh-h			10.40			
Vehi	cle Value of Tim	ie (VOT), \$/h	25.00	25.00			Total Delay Cost, \$						
Copyri	opyright © 2023 University of Florida. All Rights Reserved. HCS T Freeways Version 2023 Generated: 08/25/2023 10:44:22												

HCS M Freeways Version 2023 I-90 WB 2045 PM - OPTION 2.xuf

Seq1Seq2Seq3Seq3Seq4Seq5Seq6Seq7Seq8Seq9Seq10Seq11Seq12AP1DDCDDDCCCCCCDAP1DSeq13Seq2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1Seg1Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1Seg3Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1Seg3Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1Seg3Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1Seg3Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1Seg3Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1Seg3Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1Seg3Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1Seg3Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg13Seg12 <th></th> <th colspan="12">LOS</th>		LOS															
Seg 13Seg 13Seg 1Seg 1 <t< td=""><td></td><td>Seg 1</td><td>Seg 2</td><td>Seg 3</td><td>Seg 4</td><td>Seg 5</td><td>Seg 6</td><td>Seg 7</td><td>Seg 8</td><td>Seg 9</td><td>Seg 10</td><td>Seg 11</td><td>Seg 12</td></t<>		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12				
AP1DSeg1 Seg2 Seg3 Seg4 Seg4 Seg5 Seg6 Seg7 Seg8 Seg8 Seg9 Seg10 Seg11 Seg12AP1223304302605	AP 1	D	D	С	С	D	D	С	С	С	С	С	D				
Seq 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12           AP 1         628         648         694         617         660         652         693         626         665         66		Seg 13															
Seq 1         Seq 2         Seg 3         Seq 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12           AP 1         628         648         694         617         660         635         626         635         663         673         663         663         663         663         673         663         663         663         673         663         663         663         673         663         663         663         673         663         663         663         663         663         663         663         663         663         663         66	AP 1	D															
AP 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 10Seg 11Seg 12Seg 13Seg 10Seg 13Seg 10Seg 11Seg 12Seg 13Seg 10Seg 13Seg 10Seg 11Seg 12Seg 10Seg 11Seg 12Seg 13Seg 14Seg 12Seg 14O///O///O///Seg 10Seg 11Seg 11Seg 12Seg 10Seg 11Seg 12Seg 10Seg 11Seg 12Seg 10Seg 11Seg 12Seg 10Seg 11Seg 12Seg 14O///O///O///O///O///O///O///O///O///Seg 11Seg 11Seg 11Seg 11Seg 12Seg 13Seg 14Seg 12Seg 14Seg 14Seg 12Seg 14Seg			Speed (mi/h)														
Seg 13AP 1Seg 3AP 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 131.730.720.728.027.127.319.025.422.823.518.129.0Seg 13Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 10AP 130.0720.728.027.127.319.025.422.823.518.129.0AP 130.0720.728.027.127.319.025.428.828.9Seg 10Seg 11Seg 13AP 130.0Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 10.80Seg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 10.80Seg 1Seg 13Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 128.9Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 128.9Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 129.9Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12				
AP 1633ISO Seg1 Seg2 Seg3 Seg4 Seg5 Seg6 Seg7 Seg8 Seg9 Seg10 Seg11 Seg12AP 131730.720.728.027.127.319.025.428.828.518.129.0AP 130.720.728.027.127.319.025.428.828.518.129.0AP 130.730.720.728.027.127.319.025.428.828.518.129.0Seg13Seg + Seg 5Seg + Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11AP 10.030.030.000.720.740.740.550.660.650.550.550.75Age 1Seg 2Seg 4Seg 6Seg 7Seg 8Seg 9Seg 10Seg 10<	AP 1	62.8	64.8	69.4	61.7	66.0	65.5	69.8	62.6	68.5	66.5	69.9	60.8				
Density (pc/mi/ln)Geg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 130720728027.127.319.025.422.823.518.129.0Seg 1330.227.127.319.025.422.823.518.129.0AP 130.227.528.9Seg 1350.259.6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 10.330.600.720.740.740.550.660.650.550.530.77Seg 1358.938.90.600.650.650.530.7159.1Seg 120.77AP 10.830.600.720.740.740.550.660.650.550.530.77Seg 13Seg 140.830.600.720.740.740.550.660.650.550.530.77AP 10.83Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 12.8419.22.592.44Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 12.85Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1Seg 1Seg 2Seg 3		Seg 13															
Seg1Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1307207280271273190254228235181290Seg13302AP1302Understand Seg13AP1302Understand Seg13Seg13Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP10.830.600.720.740.740.550.660.650.550.530.77Seg13Seg136600.720.740.740.550.660.650.550.530.77AP10.830.600.720.740.740.550.660.650.550.530.77Seg13Seg13Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP1294284192259244246171229211218168248AP1285Seg13Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP12841922.592.443074.66Seg7Seg8Seg9Seg10Seg11Seg12AP1285Seg1Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11 </td <td>AP 1</td> <td>63.8</td> <td></td>	AP 1	63.8															
AP131.730.720.728.027.127.319.025.422.823.518.129.0Seg 1330.2AP130.2Jose Jose Jose Jose Jose Jose Jose Jose						Den	sity (pc/n	ni/ln)									
Seq 1 AP1302Seq 3 Seq 3 Seg 4 Seg 3 Seg 3 Seg 4 Seg 4 Seg 3 Seg 4 Seg 4 Seg 5 Seg 6 Seg 6 Seg 7 Seg 8 Seg 8 Seg 8 Seg 9 Seg 10 Seg 10 Seg 11 Seg 12 Seg 12 Seg 12 Seg 13 Seg 12 Seg 14 Seg 14 		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12				
AP1302Seg1 Seg2 Seg3 Seg4 Seg5 Seg6 Seg7 Seg8 Seg9 Seg0 Seg10 Seg11 Seg12AP10.830.600.720.740.750.660.650.650.530.77AP10.830.600.600.720.740.740.550.660.650.550.530.77AP10.800.600.650.650.650.650.650.650.650.650.650.65AP10.800.650.650.650.650.650.650.650.650.650.65AP10.800.655.62Seg7Seg8Seg9Seg10Seg11Seg12AP129428.619.22.5.92.4.42.4.617.12.9.92.1.12.1.816.82.4.8AP128.528.63Seg13Seg142.6.617.12.9.92.1.12.1.816.82.4.8AP128.528.5Seg3Seg4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 11Seg 12AP13.2.92.9.22.9.23.0.73.0.72.4.82.4.82.7.2AP13.2.9Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP13.Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP100CC <td>AP 1</td> <td>31.7</td> <td>30.7</td> <td>20.7</td> <td>28.0</td> <td>27.1</td> <td>27.3</td> <td>19.0</td> <td>25.4</td> <td>22.8</td> <td>23.5</td> <td>18.1</td> <td>29.0</td>	AP 1	31.7	30.7	20.7	28.0	27.1	27.3	19.0	25.4	22.8	23.5	18.1	29.0				
isolation in the construction of the c		Seg 13															
Seq 1Seq 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 10.800.600.720.740.740.750.660.650.650.530.77AP 10.800.720.740.750.660.650.650.650.530.77AP 10.80 <td>AP 1</td> <td>30.2</td> <td></td>	AP 1	30.2															
AP10.830.630.600.720.740.740.550.660.650.650.650.530.77AP10.80Very seg 1Very seg 1Seg 13AP10.80Very seg 1Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP129.428.419.225.924.424.617.122.921.121.816.824.8Person 19Seg 13Seg 13AP128.5Seg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP128.5Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP132.9Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP1.Seg 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP1 <td></td> <td></td> <td colspan="12">Demand - Capacity Ratio (D/C)</td>			Demand - Capacity Ratio (D/C)														
Norm AP1Seg 13 0.80AP10.80Use Seg 1Seg 1Seg 1Seg 1Seg 1Seg 2Seg 3Seg 1Seg 1Seg 2Seg 3Seg 1Seg 1Seg 1Seg 1Seg 2Seg 3Seg 1Seg 2Seg 3Seg 1Seg 2Seg 3Seg 2Seg 3Seg 2Seg 3Seg 2Seg 3Seg 2Seg 3Seg 2Seg 3Seg 3Seg 3Seg 3Seg 4Seg 4Seg 5Seg 4Seg 4Seg 4Seg 6Seg 4Seg 4Seg 6Seg 4Seg 6 <td <="" colspan="4" td=""><td></td><td>Seg 1</td><td>Seg 2</td><td>Seg 3</td><td>Seg 4</td><td>Seg 5</td><td>Seg 6</td><td>Seg 7</td><td>Seg 8</td><td>Seg 9</td><td>Seg 10</td><td>Seg 11</td><td>Seg 12</td></td>	<td></td> <td>Seg 1</td> <td>Seg 2</td> <td>Seg 3</td> <td>Seg 4</td> <td>Seg 5</td> <td>Seg 6</td> <td>Seg 7</td> <td>Seg 8</td> <td>Seg 9</td> <td>Seg 10</td> <td>Seg 11</td> <td>Seg 12</td>					Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 10.800bersitively viely vi	AP 1	0.83	0.83	0.60	0.72	0.74	0.74	0.55	0.66	0.65	0.65	0.53	0.77				
Normal ProblemSeg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 129428419.225.924.424.617.122.921.121.816.824.8Beg 13Seg 1428.525.524.424.617.122.921.121.816.824.8AP 128.5Seg 13Seg 1Seg 13Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1-32.92.927.2-30.7-24.8-27.2AP 127.22.121.8Seg 10Seg 11Seg 12AP 132.92.927.230.7-24.8-27.2AP 130.7-24.8-27.2AP 1AP 1-DCCDDCCCCDDAP 1DDCCDDCCCCDD <td></td> <td>Seg 13</td> <td></td>		Seg 13															
Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 128.419.225.924.424.617.122.921.121.816.824.8AP 128.5AP 128.5Density in Ram Pilleuro Area (primiding)Seg 13Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 132.9.27.2.30.7.24.8.27.2Ap 132.9.27.2.30.7.24.8.27.2Ap 132.9.27.2.30.7.24.827.2Ap 132.9.27.2.30.7.24.8.27.2Ap 130.7.24.8Ap 1	AP 1	0.80															
AP 129.428.419.225.924.424.617.122.921.121.816.824.8Seg 13AP 128.5Density is seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 13AP 132.927.230.724.827.2AP 127.2AP 1Seg 13Seg 13AP 1<						Dens	ity (veh/	mi/ln)									
Seg 13 28.5AP 128.5Density in Rame Density in Ram		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12				
AP 128.5Persity is consistent with the consistent of the consistency of	AP 1		28.4	19.2	25.9	24.4	24.6	17.1	22.9	21.1	21.8	16.8	24.8				
Name is the index of the inde		Seg 13															
Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1<	AP 1	28.5															
AP 1Seg 13AP 1					Density	in Ramp	Influenc	e Area (p	c/mi/ln)								
Seg 13AP 1-AP 1-Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1DCCDCCCCDDAP 1DCCDCCCCDAP 1DCSeg 13CSeg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11AP 1DCSeg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1DCSeg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1CCCCCSeg 9Seg 10Seg 11Seg 12AP 1Seg 1Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1CCCCCSeg 9Seg 10Seg 11Seg 12AP 1CCCCCCCCCC		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12				
AP 1.AP 1.Vertical Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1 <td>AP 1</td> <td>-</td> <td>32.9</td> <td>-</td> <td>27.2</td> <td>-</td> <td>30.7</td> <td>-</td> <td>24.8</td> <td>-</td> <td>27.2</td> <td>-</td> <td>-</td>	AP 1	-	32.9	-	27.2	-	30.7	-	24.8	-	27.2	-	-				
Density-Base LOSSeg1Seg2Seg3Seg4Seg5Seg6Seg7Seg8Seg9Seg10Seg11Seg12AP 1DCCDDCCCCCDAP 1DColspan="6">Colspan="6"Colspan=		Seg 13															
AP 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 12AP 1DDCCDDCCCCCDAP 1DCCCCCCCCDAP 1DCCCCCCCCDSeg 13Colspan="6">Colspan="6"Colspan="6">Colspan="6"Colspan="6"Colspan="6">Colspan="6"Co	AP 1	-															
AP 1DDCCDDCCCCDSeg 13						Dens	sity-Base	d LOS									
Seg 13AP 1DDemand-Based LOSSeg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11Seg 12AP 1 <t< th=""><th></th><th>Seg 1</th><th>Seg 2</th><th>Seg 3</th><th>Seg 4</th><th>Seg 5</th><th>Seg 6</th><th>Seg 7</th><th>Seg 8</th><th>Seg 9</th><th>Seg 10</th><th>Seg 11</th><th>Seg 12</th></t<>		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12				
AP 1DDem-Based LOSImage: Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11Seg 12AP 1	AP 1	D	D	С	С	D	D	С	С	С	С	С	D				
Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11       Seg 12         AP 1       - <td< td=""><td></td><td>Seg 13</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>		Seg 13															
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 12           AP 1         -	AP 1	D															
AP1         -						Dema	and-Base	d LOS									
		Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12				
Seg 13	AP 1	-	-	-	-	-	-	-	-	-	-	-	-				
		Seg 13															

AP 1	-											
	Volume - Capacity Ratio (V/C)											
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.83	0.83	0.60	0.72	0.74	0.74	0.55	0.66	0.65	0.65	0.53	0.77
	Seg 13											
AP 1	0.80											

# HCS Basic Freeway Report

Project Information			
Analyst	GSH	Date	2/17/2023
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	I-90 east of SR-611
Analysis Period Number	1	Segment Analysis Period	16:00-16:15
Geometric Data			
Number of Lanes (N), In	3	Terrain Type	Level
Segment Length (L), ft	3860	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	5190	Heavy Vehicle Adjustment Factor (fHV)	0.926
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1988
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.83
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	62.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	31.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

Project information						
Segment Number 2			Segment Name	I-90 Exit R	amp to SR-611	
Analysis Period Number 1			Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD),	ft	1500	580		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs,	CAFCAV		1.000	-		
Final Capacity Adjustment Factor (CA	F)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			5190	1440		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			8.00	3.00	3.00	
Heavy Vehicle Adjustment Factor (fHV	/)		0.926	0.971	0.971	
Flow Rate (vi), pc/h			5963	1578		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h			7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.83	0.72		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft	-	Flow Outer Lanes (vOA), pc/h/ln		2026	
Downstream Equilibrium Distance (LE	Q), ft	-	Off-Ramp Influence Area Speed	l (SR), mi/h	61.3	
Flow in Lanes 1 and 2 (v12), pc/h		3937	Outer Lanes Freeway Speed (SC	), mi/h	72.8	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h		64.8	
Number of Outer Lanes on Freeway (	NO), In	1	Average Density (D), pc/mi/ln		30.7	
Level of Service (LOS)		D	Density in Ramp Influence Area	(DR), pc/mi/ln	32.9	
			-		-	

HCS Basic Freeway Report					
Project Information					
Segment Number	3	Segment Name	I-90 below SR-611 (3-lane section)		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	2310	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	3750	Heavy Vehicle Adjustment Factor (fHV)	0.926		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1436		
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.60		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.4		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.7		
Total Ramp Density Adjustment	-	Level of Service (LOS)	с		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information					
Segment Number 4		Segment Name	I-90 Entra	nce Ramp from SR-611	
Analysis Period Number 1		Segment Analysis Period	16:00-16:1	15	
Geometric Data					
		Freeway	Ramp		
Number of Lanes (N), In		3	1		
Free-Flow Speed (FFS), mi/h		70.0	55.0		
Segment Length (L) / Acceleration Lengtl	n (LA), ft	1500	790		
Terrain Type		Level	Level		
Percent Grade, %		-	-		
Segment Type / Ramp Type		Freeway	Right-Side	ed One-Lane	
Adjustment Factors					
Driver Population		All Familiar	All Familia	r	
Weather Type		Non-Severe Weather	Non-Seve	re Weather	
Incident Type		No Incident	-		
Proportion of CAVs in Traffic Stream		0	-	-	
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000	
Demand Adjustment Factor (DAF)		1.000	1.000		
Capacity Adjustment Factor for CAVs, CA	1.000	-			
Final Capacity Adjustment Factor (CAF)		1.000	1.000		
Demand and Capacity					
Demand Volume (Vi), veh/h		3750	790		
Peak Hour Factor (PHF)		0.94	0.94	0.94	
Total Trucks, %		8.00	5.00	5.00	
Heavy Vehicle Adjustment Factor (fHV)		0.926	0.952		
Flow Rate (vi), pc/h		4308	883		
Capacity (cmd), pc/h		7200	2200		
Adjusted Capacity (cmda), pc/h		7200	2200		
Volume-to-Capacity Ratio (v/c)		0.72	0.40		
Speed and Density					
Upstream Equilibrium Distance (LEQ), ft	1936.2	Flow Outer Lanes (vOA), pc/h/	/ln	1723	
Downstream Equilibrium Distance (LEQ), 1	ft 6542.0	On-Ramp Influence Area Spe	ed (SR), mi/h	59.9	
Flow in Lanes 1 and 2 (v12), pc/h	2585	Outer Lanes Freeway Speed (	SO), mi/h	65.6	
Flow Entering Ramp-Infl. Area (vR12), pc/	h 3468	Ramp Junction Speed (S), mi/	Ramp Junction Speed (S), mi/h 61.7		
Number of Outer Lanes on Freeway (NO)	, In 1	Average Density (D), pc/mi/ln	1	28.0	
Level of Service (LOS)	С	Density in Ramp Influence Ar	ea (DR), pc/mi/ln	27.2	

HCS Basic Freeway Report					
Project Information					
Segment Number	5	Segment Name	I-90 b/w SR-611 and SR-254		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	11410	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	4540	Heavy Vehicle Adjustment Factor (fHV)	0.901		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1787		
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.74		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	66.0		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	27.1		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information						
Segment Number	6		Segment Name	I-90 Exit R	amp to SR-254	
Analysis Period Number	1		Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration L	ength (LD)	, ft	1500	500		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs	s, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			4540	1170		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			11.00	2.00	2.00	
Heavy Vehicle Adjustment Factor (fH	IV)		0.901	0.980	0.980	
Flow Rate (vi), pc/h			5360	1270		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h	ı		7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.74	0.58		
Speed and Density						
Upstream Equilibrium Distance (LEQ)	), ft	9022.1	Flow Outer Lanes (vOA), pc/h/lr	n	1767	
Downstream Equilibrium Distance (L	.EQ), ft	-	Off-Ramp Influence Area Spee	d (SR), mi/h	62.1	
Flow in Lanes 1 and 2 (v12), pc/h		3593	Outer Lanes Freeway Speed (So	0), mi/h	73.8	
Flow Entering Ramp-Infl. Area (vR12)	, pc/h	-	Ramp Junction Speed (S), mi/h		65.5	
Number of Outer Lanes on Freeway (NO), In 1		Average Density (D), pc/mi/ln 27.3		27.3		
Number of Outer Lanes on Freeway (NO), In     1       Level of Service (LOS)     D		Average Density (D), pc/mi/m		27.5		

HCS Basic Freeway Report							
Project Information	Project Information						
Segment Number	7	Segment Name	I-90 below SR-254				
Analysis Period Number	1	Segment Analysis Period	16:00-16:15				
Geometric Data							
Number of Lanes (N), In	3	Terrain Type	Level				
Segment Length (L), ft	2790	Percent Grade, %	-				
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-				
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83				
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0				
Right-Side Lateral Clearance, ft	-						
Adjustment Factors							
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000				
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000				
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000				
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000				
Demand and Capacity		- -					
Demand Volume (V), veh/h	3370	Heavy Vehicle Adjustment Factor (fHV)	0.901				
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1326				
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400				
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400				
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400				
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.55				
Speed and Density							
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.8				
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	19.0				
Total Ramp Density Adjustment	-	Level of Service (LOS)	с				
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0						

Project mormation						
Segment Number 8			Segment Name	I-90 Entrar	nce Ramp from SR-254	
Analysis Period Number 1			Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Le	ngth (LA), ft		1500	830		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors				•		
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs, CAFcAv			1.000	-		
Final Capacity Adjustment Factor (CAI	F)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			3370	710		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			11.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (fHV	)		0.901	0.962		
Flow Rate (vi), pc/h			3979	785		
Capacity (cmd), pc/h			7200	2200		
Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.66	0.36		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft 186	2.6	Flow Outer Lanes (vOA), pc/h/	′ln	1588	
Downstream Equilibrium Distance (LE	Q), ft 434	9.6	On-Ramp Influence Area Spe	ed (SR), mi/h	61.0	
Flow in Lanes 1 and 2 (v12), pc/h	239	1	Outer Lanes Freeway Speed (	SO), mi/h	66.1	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 317	6	Ramp Junction Speed (S), mi/h 62.6		62.6	
Number of Outer Lanes on Freeway (I	NO), In 1		Average Density (D), pc/mi/ln		25.4	
Level of Service (LOS)	С		Density in Ramp Influence Are	ea (DR), pc/mi/ln	24.8	

HCS Basic Freeway Report					
Project Information					
Segment Number	9	Segment Name	I-90 b/w SR-254 and SR-57		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	6450	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	4080	Heavy Vehicle Adjustment Factor (fHV)	0.926		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1562		
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.65		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.5		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.8		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

Project information						
Segment Number	10		Segment Name	I-90 Exit R	amp to SR-57	
Analysis Period Number	1		Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration L	ength (LD).	, ft	1500	480		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	ed One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)	)		1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAV	s, CAFcav		1.000	-		
Final Capacity Adjustment Factor (Ca	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			4080	780		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			8.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (f	IV)		0.926	0.962		
Flow Rate (vi), pc/h			4687	863		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/ł	า		7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.65	0.39		
Speed and Density						
Upstream Equilibrium Distance (LEQ	), ft	6942.7	Flow Outer Lanes (vOA), pc/h/h	n	1518	
Downstream Equilibrium Distance (L	EQ), ft	-	Off-Ramp Influence Area Spee	d (SR), mi/h	63.1	
Flow in Lanes 1 and 2 (v12), pc/h		3169	Outer Lanes Freeway Speed (S	0), mi/h	74.8	
Flow Entering Ramp-Infl. Area (vR12)	, pc/h	-	Ramp Junction Speed (S), mi/h	1	66.5	
Number of Outer Lanes on Freeway	(No), In	1	Average Density (D), pc/mi/ln		23.5	
Level of Service (LOS)		С	Density in Ramp Influence Are	a (DR), pc/mi/ln	27.2	

HCS Basic Freeway Report						
Project Information						
Segment Number	11	Segment Name	I-90 below SR-57			
Analysis Period Number	1	Segment Analysis Period	16:00-16:15			
Geometric Data						
Number of Lanes (N), In	3	Terrain Type	Level			
Segment Length (L), ft	2870	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.17			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors	•	•				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	3300	Heavy Vehicle Adjustment Factor (fHV)	0.926			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1264			
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.53			
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.1			
Total Ramp Density Adjustment	-	Level of Service (LOS)	С			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

		HCS Freeway	y V	Veaving Repo	ort		
Project Information							
Segment Number	_	12	_	Segment Name		I-90 b/w SR-57 and SR-2 Weave	
Analysis Period Number		1		Segment Analysis Pe	riod	16:00-16:15	
Geometric Data							
Number of Lanes (N), In		3		Segment Type		Freeway	
Segment Length (Ls), ft		4300		Number of Maneuve	r Lanes (NWL), In	0	
Weaving Configuration		Two-Sided		Ramp-to-Freeway La	ne Changes (LCRF), lc	1	
Terrain Type		Level		Freeway-to-Ramp La	ne Changes (LCFR), lc	1	
Percent Grade, %		-		Ramp-to-Ramp Lane	Changes (LCRR), lc	1	
Interchange Density (ID), int/mi		0.67		Cross Weaving Mana	iged Lane	No	
Adjustment Factors		•		•		•	
Driver Population		All Familiar		Final Speed Adjustme	ent Factor (SAF)	1.000	
Weather Type		Non-Severe Weath				1.000	
Incident Type		No Incident		Capacity Adjustment	Factor for CAVs, CAFCAV	1.000	
Proportion of CAVs in Traffic Stream		0		Final Capacity Adjust	1.000		
Demand and Capacity				A			
		FF	<b>—</b>	RF	RR	FR	
Demand Volume (Vi), veh/h	22	90	113	30	90	1010	
Peak Hour Factor (PHF)	0.9	)4	0.9	4	0.94	0.94	
Total Trucks, %	10	.00	10.	.00	10.00	10.00	
Heavy Vehicle Adjustment Factor (fHV)	0.9	909	0.9	09	0.909	0.909	
Flow Rate (vi), pc/h	26	80	132	22	105	1182	
Weaving Flow Rate (vw), pc/h	10	5	lde	al Conditions Capacity	/ (cIFL), pc/h/ln	2400	
Non-Weaving Flow Rate (vNW), pc/h	51	84	De	nsity-Based Capacity (	cIWL × N × fHV), veh/h	6209	
Total Flow Rate (v), pc/h	52	89	De	mand Flow-Based Cap	oacity (cIW × fHV), veh/h	-	
Volume Ratio (VR)	0.0	)20	We	eaving Area Capacity (	cW), veh/h	6209	
Minimum Lane Change Rate (LCMIN), lc/h	10	5	Ad	justed Weaving Area (	Capacity (cWA), veh/h	6209	
Maximum Weaving Length (LMAX), ft	59	12	Vo	lume-to-Capacity Ratio	o (v/c)	0.77	
Speed and Density							
Non-Weaving Vehicle Index (INW)		1494		Average Weaving Sp	eed (Sw), mi/h	61.5	
Non-Weaving Lane Change Rate (LCNW), lc/h		2828		Average Non-Weavir	ng Speed (SNW), mi/h	60.8	
Weaving Lane Change Rate (LCw), lc/h	440		Average Speed (S), m	ni/h	60.8		
Weaving Lane Change Rate (LCAII), lc/h	3268	Density (D), pc/mi/ln			29.0		
Weaving Intensity Factor (W)		0.182		Level of Service (LOS)	)	D	

	HCS Basic F	reeway Report	
Project Information			
Segment Number	13	Segment Name	SR-2 West of I-90/SR-2 Diverge
Analysis Period Number	1	Segment Analysis Period	16:00-16:15
Geometric Data			
Number of Lanes (N), In	2	Terrain Type	Level
Segment Length (L), ft	5000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
rer Population All Familiar Final Speed Adjustment Factor (SAF)			1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000
Demand and Capacity			
Demand Volume (V), veh/h	3420	Heavy Vehicle Adjustment Factor (fHV)	0.943
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1929
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.80
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	63.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	30.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

HCS 1000 Freeways version 2020 I-90 WB 2045 PM - OPTION 2.xuf

## HCS Freeway Facilities Report

## **Project Information**

Analyst	GSH	Date	2/17/2023
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Facility Name	I-90 WB OPTION 3	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

### Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	13
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	8.99		

## Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-90 east of SR-611	3860	3
2	Diverge	Diverge	I-90 Exit Ramp to SR-611	1500	3
3	Basic	Basic	I-90 below SR-611 (3-lane section)	2310	3
4	Merge	Merge	I-90 Entrance Ramp from SR-611	1500	3
5	Basic	Basic	I-90 b/w SR-611 and SR-254	11410	3
6	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	3
7	Basic	Basic	I-90 below SR-254	2790	3
8	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	3
9	Basic	Basic	I-90 b/w SR-254 and SR-57	6450	3
10	Diverge	Diverge	I-90 Exit Ramp to SR-57	1500	3
11	Basic	Basic	I-90 below SR-57	2870	3
12	Weaving	Weaving	I-90 b/w SR-57 and SR-2 Weave	5300	4
13	Basic	Basic	SR-2 West of I-90/SR-2 Diverge	5000	3

### Facility Segment Data

							Segme	nt 1: Ba	sic						
АР	PI	HF	fŀ	łV	Flow (pc/		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.	94	0.9	926	338	39	720	00	0.4	47	7(	).0	16	5.1	В
							Segmen	t 2: Div	erge						
АР	PI	HF	fŀ	łV	Flow (pc/		Capa (pc/		d, Ra	/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.971	3389	844	7200	2200	0.47	0.38	66.4	63.2	17.0	20.2	С
							Segme	nt 3: Ba	sic						
АР	PI	HF	fŀ	IV	Flow (pc,		Capa (pc,	-	-	/c tio	•	eed i/h)		nsity ni/ln)	LOS

1	0.9	94	0.9	26	250	)4	720	00	0.	35	69	9.8	1'	1.9	В
							Segmer		<u> </u>						
АР	Pł	łF	fH	IV	Flow (pc/		Capa (pc/	city	d, Ra			eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.952	3029	525	7200	2200	0.42	0.24	64.3	62.6	15.7	16.2	В
							Segme	nt 5: Ba	asic						
AP	Pł	łF	fH	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	01	312	29	720	00	0.4	43	70	0.0	14	1.9	В
							Segmen	t 6: Div	erge						
AP	Pł	łF	fH	IV	Flow (pc/		Capa (pc/		d, Ra			eed i/h)	Der (pc/r	nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.980	3129	619	7200	2200	0.43	0.28	66.9	63.7	15.6	19.2	В
							Segme	nt 7: Ba	asic						
AP	Pł	łF	fH	IV	Flow (pc/		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	01	245	56	720	00	0.3	34	69	9.9	1'	1.7	В
							Segmer	nt 8: Me	erge						
AP	Pł	łF	fH	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.962	2898	442	7200	2200	0.40	0.20	64.6	62.8	15.0	15.1	В
							Segme	nt 9: Ba	asic						
AP	Pł	łF	fH	IV	Flow (pc/		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	26	284	19	720	00	0.4	40	70	).0	13	3.6	В
						5	Segment	10: Div	/erge						
АР	Pł	łF	fH	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.962	2849	531	7200	2200	0.40	0.24	67.1	64.0	14.2	17.7	В
							Segmer	nt 11: B	asic						
АР	Pł	łF	fH	IV	Flow (pc/		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	26	229	98	720	00	0.3	32	69	9.9	1(	).9	A
						S	egment	12: We	aving						
AP	Pł	łF	fH	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	09	34(	)5	911	16	0.3	37	65	5.0	13	3.1	В
							Segmer	nt 13: B	asic						
АР	Pł	łF	fH	IV	Flow (pc/		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS

1	0.94	0.943	2629	7200	7200 0.37 70		70.0			12.5	В	
Facility Analysis Results												
AP	APVMTVMT-Demand veh-mi/APVHD veh-h/APTotal Delay Cost \$/APSpeed mi/hDensity pc/mi/lnDensity veh/mi/lnTT minLOS											
1 6096 5443 1.77 44.23 68.6 13.9 12.6 7.90 B										В		
Fac	ility Overal	l Results										
Spac	e Mean Speed,	mi/h	68.6		Averag	e Density, ve	eh/mi/ln	12.6	5			
Aver	age Travel Time	, min	7.90		Averag	e Density, po	c/mi/ln	13.9	)			
Total VMT, veh-mi     6096     Total VHD, veh-h     1.77												
Vehicle Value of Time (VOT), \$/h     25.00     Total Delay Cost, \$     44.23												
Copyri	pyright © 2023 University of Florida. All Rights Reserved. HCSTM Freeways Version 2023 Generated: 08/25/2023 10:42:34											

I-90 WB 2045 AM - OPTION 3.xuf

						LOS						
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	В	С	В	В	В	В	В	В	В	В	А	В
	Seg 13											
AP 1	В											
					S	peed (mi/	⁄h)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	70.0	66.4	69.8	64.3	70.0	66.9	69.9	64.6	70.0	67.1	69.9	65.0
	Seg 13											
AP 1	70.0											
					Dens	sity (pc/n	ni/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	16.1	17.0	11.9	15.7	14.9	15.6	11.7	15.0	13.6	14.2	10.9	13.1
	Seg 13											
AP 1	12.5											
				D	emand -	Capacity	Ratio (D/	<b>′C)</b>				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.47	0.47	0.35	0.42	0.43	0.43	0.34	0.40	0.40	0.40	0.32	0.37
	Seg 13											
AP 1	0.37											
					Dens	ity (veh/ı	mi/ln)					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	14.9	15.7	11.0	14.5	13.4	14.1	10.5	13.5	12.6	13.1	10.1	11.2
	Seg 13											
AP 1	11.8											
				Density	in Ramp	Influenc	e Area (p	c/mi/ln)				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	-	20.2	-	16.2	-	19.2	-	15.1	-	17.7	-	-
	Seg 13											
AP 1	-											
					Dens	sity-Base	d LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	В	С	В	В	В	В	В	В	В	В	А	В
	Seg 13											
AP 1	В											
					Dema	and-Base	d LOS					
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	-	-	-	-	-	-	-	-	-	-	-	-
	Seg 13											

AP 1	-											
				V	olume - O	Capacity	Ratio (V/	<b>C</b> )				
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.47	0.47	0.35	0.42	0.43	0.43	0.34	0.40	0.40	0.40	0.32	0.37
	Seg 13											
AP 1	0.37											

# HCS Basic Freeway Report

Project Information			
Analyst	GSH	Date	2/17/2023
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	I-90 east of SR-611
Analysis Period Number	1	Segment Analysis Period	08:00-08:15
Geometric Data			
Number of Lanes (N), In	3	Terrain Type	Level
Segment Length (L), ft	3860	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	2950	Heavy Vehicle Adjustment Factor (fHV)	0.926
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1130
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.47
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

Project information							
Segment Number 2			Segment Name	I-90 Exit R	amp to SR-611		
Analysis Period Number 1			Segment Analysis Period	08:00-08:1	5		
Geometric Data							
			Freeway	Ramp			
Number of Lanes (N), In			3	1			
Free-Flow Speed (FFS), mi/h			70.0	55.0			
Segment Length (L) / Deceleration Le	ength (LD),	ft	1500	580			
Terrain Type			Level	Level			
Percent Grade, %			-	-			
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane		
Adjustment Factors							
Driver Population			All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	re Weather		
Incident Type			No Incident	-			
Proportion of CAVs in Traffic Stream			0	-			
Final Speed Adjustment Factor (SAF)			1.000	1.000			
Demand Adjustment Factor (DAF)			1.000	1.000			
Capacity Adjustment Factor for CAVs,	CAFCAV		1.000	-			
Final Capacity Adjustment Factor (CA	F)		1.000	1.000 1.000			
Demand and Capacity							
Demand Volume (Vi), veh/h			2950	770			
Peak Hour Factor (PHF)			0.94	0.94	0.94		
Total Trucks, %			8.00	3.00			
Heavy Vehicle Adjustment Factor (fHV	/)		0.926	0.971			
Flow Rate (vi), pc/h			3389	844			
Capacity (cmd), pc/h			7200	2200			
Initial Adjusted Capacity (cmda), pc/h			7200	-			
Final Adjusted Capacity (cmda), pc/h			7200	2200			
Volume-to-Capacity Ratio (v/c)			0.47	0.38			
Speed and Density							
Upstream Equilibrium Distance (LEQ),	ft	-	Flow Outer Lanes (vOA), pc/h/ln	1	926		
Downstream Equilibrium Distance (LE	Q), ft	-	Off-Ramp Influence Area Speed	d (SR), mi/h	63.2		
Flow in Lanes 1 and 2 (v12), pc/h		2463	Outer Lanes Freeway Speed (Sc	), mi/h	76.8		
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h 66.4		66.4		
Number of Outer Lanes on Freeway (	NO), In	1	Average Density (D), pc/mi/ln 17.0				
Level of Service (LOS) C Density in Ramp Influence Area (DR), pc/mi/ln 20.2			20.2				
Level of Service (LOS)					-		

HCS Basic Freeway Report							
Project Information							
Segment Number	3	Segment Name	I-90 below SR-611 (3-lane section)				
Analysis Period Number	1	Segment Analysis Period	08:00-08:15				
Geometric Data							
Number of Lanes (N), In	3	Terrain Type	Level				
Segment Length (L), ft	2310	Percent Grade, %	-				
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-				
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83				
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0				
Right-Side Lateral Clearance, ft	-						
Adjustment Factors							
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000				
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000				
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000				
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000				
Demand and Capacity							
Demand Volume (V), veh/h	2180	Heavy Vehicle Adjustment Factor (fHV)	0.926				
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	835				
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400				
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400				
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400				
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.35				
Speed and Density	Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.8				
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	11.9				
Total Ramp Density Adjustment	-	Level of Service (LOS)	В				
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0						

roject mormation						
Segment Number 4			Segment Name	I-90 Entrar	nce Ramp from SR-611	
Analysis Period Number 1			Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Leng	gth (LA), ft		1500	790		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000		
Demand Adjustment Factor (DAF)		1.000	1.000			
Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-			
Final Capacity Adjustment Factor (CAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2180	470		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			8.00	5.00	5.00	
Heavy Vehicle Adjustment Factor (fHV)			0.926	0.952	0.952	
Flow Rate (vi), pc/h			2504	525	525	
Capacity (cmd), pc/h			7200	2200	2200	
Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.42	0.24	0.24	
Speed and Density						
Upstream Equilibrium Distance (LEQ), ft	1	473.6	Flow Outer Lanes (vOA), pc/h/ln		1002	
Downstream Equilibrium Distance (LEQ)	Downstream Equilibrium Distance (LEQ), ft 3188.6		On-Ramp Influence Area Speed	(SR), mi/h	62.6	
Flow in Lanes 1 and 2 (v12), pc/h 1502		Outer Lanes Freeway Speed (SO), mi/h 68.2		60.0		
Flow Entering Ramp-Infl. Area (vR12), pc/h 2027		502	Outer Lanes Freeway Speed (So	), mi/h	68.2	
Flow Entering Ramp-Infl. Area (vR12), pc			Outer Lanes Freeway Speed (SO Ramp Junction Speed (S), mi/h	), mi/h	68.2 64.3	
Flow Entering Ramp-Infl. Area (vR12), po Number of Outer Lanes on Freeway (No	c/h 2	2027		), mi/h		

HCS Basic Freeway Report Project Information						
Analysis Period Number	1	Segment Analysis Period	08:00-08:15			
Geometric Data						
Number of Lanes (N), In	3	Terrain Type	Level			
Segment Length (L), ft	11410	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors						
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	2650	Heavy Vehicle Adjustment Factor (fHV)	0.901			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1043			
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.43			
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	14.9			
Total Ramp Density Adjustment	-	Level of Service (LOS)	В			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

Project information						
Segment Number 6	5		Segment Name	I-90 Exit R	amp to SR-254	
Analysis Period Number 1	1		Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD),	, ft	1500	500		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			•			
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000		
Demand Adjustment Factor (DAF)		1.000	1.000			
Capacity Adjustment Factor for CAVs, CAFcav		1.000	-			
Final Capacity Adjustment Factor (CA	νF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2650	570		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			11.00	2.00		
Heavy Vehicle Adjustment Factor (fH	V)		0.901	0.980	0.980	
Flow Rate (vi), pc/h			3129	619		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h			7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.43	0.28		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	, ft	5473.1	Flow Outer Lanes (vOA), pc/h/ln		871	
Downstream Equilibrium Distance (Le	EQ), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	63.7	
Flow in Lanes 1 and 2 (v12), pc/h		2258	Outer Lanes Freeway Speed (SO	), mi/h	76.8	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h		66.9	
Number of Outer Lanes on Freeway (	(No), In	1	Average Density (D), pc/mi/ln		15.6	
Level of Service (LOS)		В	Density in Ramp Influence Area	(DR), pc/mi/ln	19.2	
			B		8	

HCS Basic Freeway Report							
Project Information							
Segment Number	7	Segment Name	I-90 below SR-254				
Analysis Period Number	1	Segment Analysis Period	08:00-08:15				
Geometric Data							
Number of Lanes (N), In	3	Terrain Type	Level				
Segment Length (L), ft	2790	Percent Grade, %	-				
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-				
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83				
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0				
Right-Side Lateral Clearance, ft	-						
Adjustment Factors							
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000				
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000				
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000				
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000				
Demand and Capacity							
Demand Volume (V), veh/h	2080	Heavy Vehicle Adjustment Factor (fHV)	0.901				
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	819				
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400				
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400				
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400				
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.34				
Speed and Density	Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9				
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	11.7				
Total Ramp Density Adjustment	-	Level of Service (LOS)	В				
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0						

Project mormation						
Segment Number 8			Segment Name	I-90 Entrai	nce Ramp from SR-254	
Analysis Period Number 1			Segment Analysis Period	08:00-08:1	5	
Geometric Data			•			
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Le	ngth (LA), ft		1500	830		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			-			
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000		
Demand Adjustment Factor (DAF)		1.000	1.000			
Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-			
Final Capacity Adjustment Factor (CAI	F)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2080	400		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			11.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (fHV	)		0.901	0.962	0.962	
Flow Rate (vi), pc/h			2456	442		
Capacity (cmd), pc/h			7200	2200	2200	
Adjusted Capacity (cmda), pc/h			7200	2200	2200	
Volume-to-Capacity Ratio (v/c)			0.40	0.20	0.20	
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft 1463	3.3	Flow Outer Lanes (vOA), pc/	h/ln	980	
Downstream Equilibrium Distance (LE	Q), ft 2676	5.3	On-Ramp Influence Area Sp	peed (SR), mi/h	62.8	
Flow in Lanes 1 and 2 (v12), pc/h	1470	5	Outer Lanes Freeway Speed	l (So), mi/h	68.3	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 1918	3	Ramp Junction Speed (S), m	ni/h	64.6	
Number of Outer Lanes on Freeway (I	NO), In 1		Average Density (D), pc/mi/	′ln	15.0	
Level of Service (LOS)	В		Density in Ramp Influence A	Area (DR), pc/mi/ln	15.1	

HCS Basic Freeway Report Project Information							
							Segment Number
Analysis Period Number	1	Segment Analysis Period	08:00-08:15				
Geometric Data							
Number of Lanes (N), In	3	Terrain Type	Level				
Segment Length (L), ft	6450	Percent Grade, %	-				
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-				
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83				
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0				
Right-Side Lateral Clearance, ft	-						
Adjustment Factors							
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000				
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000				
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000				
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000				
Demand and Capacity							
Demand Volume (V), veh/h	2480	Heavy Vehicle Adjustment Factor (fHV)	0.926				
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	950				
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400				
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400				
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (Cadj), pc/h/ln	2400				
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.40				
Speed and Density							
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0				
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	13.6				
Total Ramp Density Adjustment	-	Level of Service (LOS)	В				
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0						

Project information						
Segment Number	10		Segment Name	I-90 Exit R	amp to SR-57	
Analysis Period Number	1		Segment Analysis Period	08:00-08:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration L	.ength (LD),	, ft	1500	480		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000		
Demand Adjustment Factor (DAF)		1.000	1.000			
Capacity Adjustment Factor for CAVs, CAFCAV		1.000	-			
Final Capacity Adjustment Factor (CA	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			2480	480		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			8.00	4.00		
Heavy Vehicle Adjustment Factor (fH	IV)		0.926	0.962	0.962	
Flow Rate (vi), pc/h			2849	531		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h	า		7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.40	0.24	0.24	
Speed and Density						
Upstream Equilibrium Distance (LEQ)	), ft	4606.4	Flow Outer Lanes (vOA), pc/h/ln		779	
Downstream Equilibrium Distance (L	EQ), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	64.0	
Flow in Lanes 1 and 2 (v12), pc/h		2070	Outer Lanes Freeway Speed (SO)	), mi/h	76.8	
Flow Entering Ramp-Infl. Area (vR12)	, pc/h	-	Ramp Junction Speed (S), mi/h		67.1	
Number of Outer Lanes on Freeway	(No), In	1	Average Density (D), pc/mi/ln		14.2	
Level of Service (LOS)		В	Density in Ramp Influence Area	(DR), pc/mi/ln	17.7	
		•			•	

HCS Basic Freeway Report							
Project Information							
Segment Number	11	Segment Name	I-90 below SR-57				
Analysis Period Number	1	Segment Analysis Period	08:00-08:15				
Geometric Data							
Number of Lanes (N), In	3	Terrain Type	Level				
Segment Length (L), ft	2870	Percent Grade, %	-				
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-				
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.17				
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0				
Right-Side Lateral Clearance, ft	-						
Adjustment Factors	•	•					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000				
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000				
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000				
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000				
Demand and Capacity							
Demand Volume (V), veh/h	2000	Heavy Vehicle Adjustment Factor (fHV)	0.926				
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	766				
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400				
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400				
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400				
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.32				
Speed and Density							
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9				
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	10.9				
Total Ramp Density Adjustment	-	Level of Service (LOS)	A				
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0						

	ŀ	HCS Freeway	y V	Veaving Repo	ort	
Project Information	_					
Segment Number		12 Segment Name			I-90 b/w SR-57 and SR-2 Weave	
Analysis Period Number		1		Segment Analysis Pe	riod	08:00-08:15
Geometric Data						
Number of Lanes (N), In		4		Segment Type		Freeway
Segment Length (Ls), ft		4300		Number of Maneuve	r Lanes (NwL), ln	0
Weaving Configuration		Two-Sided		Ramp-to-Freeway La	ne Changes (LCRF), lc	1
Terrain Type		Level		Freeway-to-Ramp La	ne Changes (LCFR), lc	1
Percent Grade, %		-		Ramp-to-Ramp Lane	Changes (LCRR), lc	2
Interchange Density (ID), int/mi		0.67		Cross Weaving Mana	ged Lane	No
Adjustment Factors						•
Driver Population		All Familiar		Final Speed Adjustme	ent Factor (SAF)	1.000
Weather Type		Non-Severe Weath	Non-Severe Weather Demand Adjustmer		Factor (DAF)	1.000
Incident Type		No Incident Capac		Capacity Adjustment Factor for CAVs, CAFCAV		1.000
Proportion of CAVs in Traffic Stream		0	Final Capacity Adjustment Factor (CAF)		1.000	
Demand and Capacity						•
		FF		RF	RR	FR
Demand Volume (Vi), veh/h	147	70	860	)	50	530
Peak Hour Factor (PHF)	0.9	4	0.9	4	0.94	0.94
Total Trucks, %	10.	00	10.	00	10.00	10.00
Heavy Vehicle Adjustment Factor (fHV)	0.9	09	0.9	09	0.909	0.909
Flow Rate (vi), pc/h	172	20	100	06	59	620
Weaving Flow Rate (vw), pc/h	59		lde	al Conditions Capacity	2400	
Non-Weaving Flow Rate (vNW), pc/h	334	16	De	nsity-Based Capacity (	8286	
Total Flow Rate (v), pc/h	340	)5	De	mand Flow-Based Cap	-	
Volume Ratio (VR)	0.0	17	We	eaving Area Capacity (	8286	
Minimum Lane Change Rate (LCMIN), lc/h	118	3	Ad	justed Weaving Area C	Capacity (cwA), veh/h	8286
Maximum Weaving Length (LMAX), ft	ngth (LMAX), ft 5885		Vo	lume-to-Capacity Ratio	0.37	
Speed and Density						
Non-Weaving Vehicle Index (INW)		964		Average Weaving Speed (Sw), mi/h		62.1
Non-Weaving Lane Change Rate (LCNW), lc,	/h	2249		Average Non-Weavir	ng Speed (SNW), mi/h	65.1
Weaving Lane Change Rate (LCw), lc/h		713		Average Speed (S), m	ni/h	65.0
Weaving Lane Change Rate (LCAII), lc/h		2962		Density (D), pc/mi/ln		13.1
Weaving Intensity Factor (W)		0.168		Level of Service (LOS)	)	В

	HCS Basic F	reeway Report				
Project Information						
Segment Number	13	Segment Name	SR-2 West of I-90/SR-2 Diverge			
Analysis Period Number	1	Segment Analysis Period	08:00-08:15			
Geometric Data						
Number of Lanes (N), In	3	Terrain Type	Level			
Segment Length (L), ft	5000	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors						
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	2330	Heavy Vehicle Adjustment Factor (fHV)	0.943			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	876			
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.37			
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	12.5			
Total Ramp Density Adjustment	-	Level of Service (LOS)	В			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

HCS100 Freeways version 2023 I-90 WB 2045 AM - OPTION 3.xuf

## HCS Freeway Facilities Report

### **Project Information**

Analyst	GSH	Date	2/17/2023
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Facility Name	I-90 WB OPTION 3	Units	U.S. Customary
Project Description	PID 107714 LOR-90-10.76		

### Facility Global Input

Jam Density, pc/mi/ln	190.0	Density at Capacity, pc/mi/ln	45.0
Queue Discharge Capacity Drop, %	7	Total Segments	13
Total Analysis Periods	1	Analysis Period Duration, min	15
Facility Length, mi	8.99		

### Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	I-90 east of SR-611	3860	3
2	Diverge	Diverge	I-90 Exit Ramp to SR-611	1500	3
3	Basic	Basic	I-90 below SR-611 (3-lane section)	2310	3
4	Merge	Merge	I-90 Entrance Ramp from SR-611	1500	3
5	Basic	Basic	I-90 b/w SR-611 and SR-254	11410	3
6	Diverge	Diverge	I-90 Exit Ramp to SR-254	1500	3
7	Basic	Basic	I-90 below SR-254	2790	3
8	Merge	Merge	I-90 Entrance Ramp from SR-254	1500	3
9	Basic	Basic	I-90 b/w SR-254 and SR-57	6450	3
10	Diverge	Diverge	I-90 Exit Ramp to SR-57	1500	3
11	Basic	Basic	I-90 below SR-57	2870	3
12	Weaving	Weaving	I-90 b/w SR-57 and SR-2 Weave	5300	4
13	Basic	Basic	SR-2 West of I-90/SR-2 Diverge	5000	3

### **Facility Segment Data**

							Segme	nt 1: Ba	asic						
АР	Pł	HF	f⊦	łV	Flow (pc/		Capa (pc/			/c tio		eed i/h)		nsity ni/ln)	LOS
1	0.	94	0.9	926	596	53	720	00	0.	83	62	2.8	3	1.7	D
							Segmen	t 2: Div	erge						
АР	Pł	HF	f⊦	łV	Flow (pc,		Capa (pc/	-		/c tio		eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.971	5963	1578	7200	2200	0.83	0.72	64.8	61.3	30.7	32.9	D
							Segme	nt 3: Ba	asic						
АР	Pł	HF	fŀ	IV	Flow (pc,		Capa (pc,	-		/c tio		eed i/h)		nsity ni/ln)	LOS

1	0.9	94	0.9	26	430	08	720	00	0.	60	69	9.4	20	).7	С
							Segmer	nt 4: Me	erge						
АР	Pł	łF	fH	IV	Flow (pc/		Capa (pc/	city	d, Ra			eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.952	5191	883	7200	2200	0.72	0.40	61.7	59.9	28.0	27.2	С
							Segme	nt 5: Ba	asic						
AP	Pł	łF	fH	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	01	536	50	720	00	0.	74	66	5.0	27	7.1	D
							Segmen	t 6: Div	erge						
АР	Pł	łF	fH	IV	Flow (pc/		Capa (pc/		d, Ra			eed i/h)	Der (pc/r	nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.980	5360	1270	7200	2200	0.74	0.58	65.5	62.1	27.3	30.7	D
							Segme	nt 7: Ba	asic						
АР	Pł	łF	fH	IV	Flow (pc/		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	01	397	79	720	00	0.	55	69	9.8	19	9.0	C
							Segmer	nt 8: Me	erge						
AP	Pł	łF	fH	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.901	0.962	4764	785	7200	2200	0.66	0.36	62.6	61.0	25.4	24.8	C
							Segme	nt 9: Ba	asic						
АР	Pł	łF	fH	IV	Flow (pc/		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	26	468	37	720	00	0.	65	68	3.5	22	2.8	С
						5	Segment	10: Div	/erge						
АР	Pł	łF	fH	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
	F	R	F	R	Freeway	Ramp	Freeway	Ramp	F	R	F	R Infl.	F	R Infl.	
1	0.94	0.94	0.926	0.962	4687	863	7200	2200	0.65	0.39	66.5	63.1	23.5	27.2	C
							Segmer	nt 11: B	asic						
АР	Pł	łF	fH	IV	Flow (pc,		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	26	379	91	720	00	0.	53	69	9.9	18	3.1	C
						S	egment	12: We	aving						
AP	Pł	łF	fH	IV	Flow (pc)		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS
1	0.9	94	0.9	09	528	39	910	)8	0.	58	62	2.1	21	1.3	С
							Segmer	nt 13: B	asic						
АР	Pł	łF	fH	IV	Flow (pc/		Capa (pc/		d, Ra			eed i/h)		nsity ni/ln)	LOS

1	0.94	0.943	3858	7200	)	0.54	69.9			18.4	C
Fac	ility Analys	is Results									
ΑΡ	VMT veh-mi/AP	VMT-Demano veh-mi/AP	l VHD veh-h/AP	Total Delay C \$/AP	ost	Speed mi/h	Density pc/mi/ln	Dens veh/r	,	TT min	LOS
1	10088	9075	8.81	220.22		66.0	23.9	21	.7	8.20	С
Fac	ility Overal	l Results									
Spac	e Mean Speed,	mi/h	66.0		Averag	e Density, ve	eh/mi/ln	21.7	7		
Aver	age Travel Time	, min	8.20		Averag	e Density, po	c/mi/ln	23.9	)		
Total	VMT, veh-mi		10088		Total V	HD, veh-h		8.81	l		
Vehi	cle Value of Tim	ie (VOT), \$/h	25.00		Total D	elay Cost, \$		220	.22		
Copyri	ght © 2023 Univer	sity of Florida. All Ri	ghts Reserved.	HCS 🖚 Freewa	, ys Versior	2023			Genera	ted: 08/25/2	023 10:45:49

I-90 WB 2045 PM - OPTION 3.xuf

Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 11AP 1CCCDDCCCCCCCAP 1CCCCCCCCCCCCCAP 1CCC </th	
Seg 13       AP 1       C         AP 1       C         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 1         AP 1       62.8       64.8       69.4       61.7       66.0       65.5       69.8       62.6       68.5       66.5       69.9       6         AP 1       62.8       64.8       69.4       61.7       66.0       65.5       69.8       62.6       68.5       66.5       69.9       6         AP 1       69.9       5       5       5       69.8       62.6       68.5       66.5       69.9       6         AP 1       69.9       5       5       5       69.8       62.6       68.5       66.5       69.9       6         AP 1       69.9       5       5       5       5       5       5       5       5       69.8       5       69.9       5       69.9       6       5       6       6       5       6       6       5       6       6       5       6       6       5       6       5       6       5       6       5	
AP 1       C         Seg 1       Seg 2       Seg 3       Seg 4       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 1         AP 1       62.8       64.8       69.4       61.7       66.0       65.5       69.8       62.6       68.5       66.5       69.9       6         AP 1       62.8       64.8       69.4       61.7       66.0       65.5       69.8       62.6       68.5       66.5       69.9       6         AP 1       69.9       5       5       5       69.8       62.6       68.5       66.5       69.9       6         AP 1       69.9       5       5       5       5       69.8       5       65.5       5       6         Seg 13       5       5       5       5       5       5       5       25.4       22.8       23.5       18.1       2         AP 1       18.4       5       5       5       5       5       5       25.4       22.8       23.5       18.1       2         AP 1       18.4       5       5	
Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg<8	
Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 13AP 169.969.961.766.065.569.862.668.566.569.96AP 169.969.969.969.969.969.969.96AP 169.959.959.959.959.959.959.959.9Density (pc/miln)Seg 13AP 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 10AP 131.730.720.728.027.127.319.025.422.823.518.12AP 118.459.359.959.9Seg 10Seg 11Seg 11Seg 11Seg 11Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 10AP 131.730.720.728.027.127.319.025.422.823.518.12AP 118.4555Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 10Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 4	
AP 1       62.8       64.8       69.4       61.7       66.0       65.5       69.8       62.6       68.5       66.5       69.9       6         Seg 13       AP 1       69.9       69.9       60.9       <	
Seg 13       Seg 13         AP 1       69.9         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 13         AP 1       31.7       30.7       20.7       28.0       27.1       27.3       19.0       25.4       22.8       23.5       18.1       2         AP 1       31.7       30.7       20.7       28.0       27.1       27.3       19.0       25.4       22.8       23.5       18.1       2         AP 1       18.4	
AP 1       69.9         AP 1       69.9         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 13         AP 1       31.7       30.7       20.7       28.0       27.1       27.3       19.0       25.4       22.8       23.5       18.1       2         AP 1       31.7       30.7       20.7       28.0       27.1       27.3       19.0       25.4       22.8       23.5       18.1       2         AP 1       18.4       -	
Seg 1Seg 2Seg 3Seg 4Seg 5Seg 6Seg 7Seg 8Seg 9Seg 10Seg 11Seg 13AP 131.730.720.728.027.127.319.025.422.823.518.12Seg 13Seg 13 </th	
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11	
AP 1       31.7       30.7       20.7       28.0       27.3       19.0       25.4       22.8       23.5       18.1       2         AP 1       18.4         Image: Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 13         Seg 2       Seg 3       Seg 4       Seg 6       Seg 7       Seg 8       Seg 10       Seg 11       Seg 13         Seg 13       Seg 13       Seg 13       Seg 13       Seg 13       Seg 13       Seg 13       Seg 13       Seg 13       Seg 13       Seg 13       Seg 13       Seg 13       Seg 13 <th cols<="" th=""></th>	
Seg 13         AP 1       18.4         Demand - Capacity Ratio (D/C)         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11       Seg 11	
AP 1       18.4         Demand - Capacity Ratio (D/C)         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11       Seg 10	
Demand - Capacity Ratio (D/C)         Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11	
Seg 1       Seg 2       Seg 3       Seg 4       Seg 5       Seg 6       Seg 7       Seg 8       Seg 9       Seg 10       Seg 11       Seg 11	
AP 1 0.83 0.83 0.60 0.72 0.74 0.74 0.55 0.66 0.65 0.65 0.53 0	
Seg 13	
AP 1 0.54	
Density (veh/mi/ln)	
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg	
AP 1         29.4         28.4         19.2         25.9         24.4         24.6         17.1         22.9         21.1         21.8         16.8         1	
Seg 13	
AP 1 17.4	
Density in Ramp Influence Area (pc/mi/ln)	
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11	
AP 1         -         32.9         -         27.2         -         30.7         -         24.8         -         27.2         -	
Seg 13	
AP 1 -	
Density-Based LOS	
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11	
AP1         D         C         C         D         D         C	
Seg 13	
AP1 C	
Demand-Based LOS	
Seg 1         Seg 2         Seg 3         Seg 4         Seg 5         Seg 6         Seg 7         Seg 8         Seg 9         Seg 10         Seg 11         Seg 11	
AP1	
Seg 13	

AP 1	-											
	Volume - Capacity Ratio (V/C)											
	Seg 1	Seg 2	Seg 3	Seg 4	Seg 5	Seg 6	Seg 7	Seg 8	Seg 9	Seg 10	Seg 11	Seg 12
AP 1	0.83	0.83	0.60	0.72	0.74	0.74	0.55	0.66	0.65	0.65	0.53	0.58
	Seg 13											
AP 1	0.54											

# HCS Basic Freeway Report

Project Information			
Analyst	GSH	Date	2/17/2023
Agency	СМТ	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Segment Number	1	Segment Name	I-90 east of SR-611
Analysis Period Number	1	Segment Analysis Period	16:00-16:15
Geometric Data			
Number of Lanes (N), In	3	Terrain Type	Level
Segment Length (L), ft	3860	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	5190	Heavy Vehicle Adjustment Factor (fHV)	0.926
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1988
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.83
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	62.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	31.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

# HCS Freeway Diverge Report

Project information						
Segment Number 2			Segment Name	I-90 Exit R	amp to SR-611	
Analysis Period Number 1			Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration Le	ength (LD),	ft	1500	580		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-		
Final Speed Adjustment Factor (SAF)			1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs,	CAFCAV		1.000	-		
Final Capacity Adjustment Factor (CA	F)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			5190	1440		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			8.00	3.00	3.00	
Heavy Vehicle Adjustment Factor (fHV	/)		0.926	0.971	0.971	
Flow Rate (vi), pc/h			5963	1578		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h			7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.83	0.72		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft	-	Flow Outer Lanes (vOA), pc/h/ln		2026	
Downstream Equilibrium Distance (LE	Q), ft	-	Off-Ramp Influence Area Speed	l (SR), mi/h	61.3	
Flow in Lanes 1 and 2 (v12), pc/h		3937	Outer Lanes Freeway Speed (SC	), mi/h	72.8	
Flow Entering Ramp-Infl. Area (vR12),	pc/h	-	Ramp Junction Speed (S), mi/h		64.8	
Number of Outer Lanes on Freeway (	NO), In	1	Average Density (D), pc/mi/ln		30.7	
Level of Service (LOS)		D	Density in Ramp Influence Area	(DR), pc/mi/ln	32.9	
			-		-	

HCS Basic Freeway Report					
Project Information					
Segment Number	3	Segment Name	I-90 below SR-611 (3-lane section)		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	2310	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	3750	Heavy Vehicle Adjustment Factor (fHV)	0.926		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1436		
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.60		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.4		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.7		
Total Ramp Density Adjustment	-	Level of Service (LOS)	с		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

# HCS Freeway Merge Report

rioject information					
Segment Number 4		Segment Name	I-90 Entra	nce Ramp from SR-611	
Analysis Period Number 1		Segment Analysis Period	16:00-16:1	15	
Geometric Data					
		Freeway	Ramp		
Number of Lanes (N), In		3	1		
Free-Flow Speed (FFS), mi/h		70.0	55.0		
Segment Length (L) / Acceleration Lengtl	n (LA), ft	1500	790		
Terrain Type		Level	Level		
Percent Grade, %		-	-		
Segment Type / Ramp Type		Freeway	Right-Side	ed One-Lane	
Adjustment Factors					
Driver Population		All Familiar	All Familia	r	
Weather Type		Non-Severe Weather	Non-Seve	re Weather	
Incident Type		No Incident	-		
Proportion of CAVs in Traffic Stream		0	-	-	
Final Speed Adjustment Factor (SAF)		1.000	1.000	1.000	
Demand Adjustment Factor (DAF)		1.000	1.000		
Capacity Adjustment Factor for CAVs, CA	1.000	-			
Final Capacity Adjustment Factor (CAF)		1.000	1.000		
Demand and Capacity					
Demand Volume (Vi), veh/h		3750	790		
Peak Hour Factor (PHF)		0.94	0.94	0.94	
Total Trucks, %		8.00	5.00	5.00	
Heavy Vehicle Adjustment Factor (fHV)		0.926	0.952		
Flow Rate (vi), pc/h		4308	883		
Capacity (cmd), pc/h		7200	2200		
Adjusted Capacity (cmda), pc/h		7200	2200		
Volume-to-Capacity Ratio (v/c)		0.72	0.40		
Speed and Density					
Upstream Equilibrium Distance (LEQ), ft	1936.2	Flow Outer Lanes (vOA), pc/h/	/ln	1723	
Downstream Equilibrium Distance (LEQ), 1	ft 6542.0	On-Ramp Influence Area Spe	ed (SR), mi/h	59.9	
Flow in Lanes 1 and 2 (v12), pc/h	2585	Outer Lanes Freeway Speed (	SO), mi/h	65.6	
Flow Entering Ramp-Infl. Area (vR12), pc/	h 3468	Ramp Junction Speed (S), mi/	Ramp Junction Speed (S), mi/h 61.7		
Number of Outer Lanes on Freeway (NO)	, In 1	Average Density (D), pc/mi/ln	1	28.0	
Level of Service (LOS)	С	Density in Ramp Influence Ar	ea (DR), pc/mi/ln	27.2	

HCS Basic Freeway Report					
Project Information					
Segment Number	5	Segment Name	I-90 b/w SR-611 and SR-254		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	11410	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	4540	Heavy Vehicle Adjustment Factor (fHV)	0.901		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1787		
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.74		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	66.0		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	27.1		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

# HCS Freeway Diverge Report

Project Information						
Segment Number	6		Segment Name	I-90 Exit R	amp to SR-254	
Analysis Period Number	1		Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration L	ength (LD)	, ft	1500	500		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000	1.000	
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs	s, CAFcav		1.000	-		
Final Capacity Adjustment Factor (CA	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			4540	1170		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			11.00	2.00	2.00	
Heavy Vehicle Adjustment Factor (fH	IV)		0.901	0.980	0.980	
Flow Rate (vi), pc/h			5360	1270		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/h	ı		7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.74	0.58		
Speed and Density						
Upstream Equilibrium Distance (LEQ)	), ft	9022.1	Flow Outer Lanes (vOA), pc/h/lr	n	1767	
Downstream Equilibrium Distance (L	.EQ), ft	-	Off-Ramp Influence Area Spee	d (SR), mi/h	62.1	
Flow in Lanes 1 and 2 (v12), pc/h		3593	Outer Lanes Freeway Speed (So	0), mi/h	73.8	
Flow Entering Ramp-Infl. Area (vR12)	, pc/h	-	Ramp Junction Speed (S), mi/h		65.5	
Number of Outer Lanes on Freeway (NO), In 1		Average Density (D), pc/mi/ln 27.3		27.3		
Number of Outer Lanes on Freeway (NO), In     1       Level of Service (LOS)     D		Average Density (D), pc/mi/m		27.5		

HCS Basic Freeway Report					
Project Information					
Segment Number	7	Segment Name	I-90 below SR-254		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	2790	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000		
Demand and Capacity		- -			
Demand Volume (V), veh/h	3370	Heavy Vehicle Adjustment Factor (fHV)	0.901		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1326		
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.55		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.8		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	19.0		
Total Ramp Density Adjustment	-	Level of Service (LOS)	с		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

# HCS Freeway Merge Report

Project mormation						
Segment Number 8			Segment Name	I-90 Entrar	nce Ramp from SR-254	
Analysis Period Number 1			Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Acceleration Le	ngth (LA), ft		1500	830		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors				•		
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)			1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAVs, CAFcAv			1.000	-		
Final Capacity Adjustment Factor (CAI	F)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			3370	710		
Peak Hour Factor (PHF)			0.94	0.94	0.94	
Total Trucks, %			11.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (fHV	)		0.901	0.962		
Flow Rate (vi), pc/h			3979	785		
Capacity (cmd), pc/h			7200	2200		
Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.66	0.36		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft 186	2.6	Flow Outer Lanes (vOA), pc/h/	′ln	1588	
Downstream Equilibrium Distance (LE	Q), ft 434	9.6	On-Ramp Influence Area Spe	ed (SR), mi/h	61.0	
Flow in Lanes 1 and 2 (v12), pc/h	239	1	Outer Lanes Freeway Speed (	SO), mi/h	66.1	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 317	6	Ramp Junction Speed (S), mi/h 62.6		62.6	
Number of Outer Lanes on Freeway (I	NO), In 1		Average Density (D), pc/mi/ln		25.4	
Level of Service (LOS)	С		Density in Ramp Influence Are	ea (DR), pc/mi/ln	24.8	

HCS Basic Freeway Report					
Project Information					
Segment Number	9	Segment Name	I-90 b/w SR-254 and SR-57		
Analysis Period Number	1	Segment Analysis Period	16:00-16:15		
Geometric Data					
Number of Lanes (N), In	3	Terrain Type	Level		
Segment Length (L), ft	6450	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	0.83		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000		
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000		
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000		
Demand and Capacity					
Demand Volume (V), veh/h	4080	Heavy Vehicle Adjustment Factor (fHV)	0.926		
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1562		
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400		
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400		
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.65		
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.5		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.8		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0				

# HCS Freeway Diverge Report

Project information						
Segment Number	10		Segment Name	I-90 Exit R	amp to SR-57	
Analysis Period Number	1		Segment Analysis Period	16:00-16:1	5	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			70.0	55.0		
Segment Length (L) / Deceleration L	ength (LD).	, ft	1500	480		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	ed One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Proportion of CAVs in Traffic Stream			0	-	-	
Final Speed Adjustment Factor (SAF)	)		1.000	1.000		
Demand Adjustment Factor (DAF)			1.000	1.000		
Capacity Adjustment Factor for CAV	s, CAFcav		1.000	-		
Final Capacity Adjustment Factor (Ca	AF)		1.000	1.000		
Demand and Capacity						
Demand Volume (Vi), veh/h			4080	780		
Peak Hour Factor (PHF)			0.94	0.94		
Total Trucks, %			8.00	4.00	4.00	
Heavy Vehicle Adjustment Factor (f	IV)		0.926	0.962		
Flow Rate (vi), pc/h			4687	863		
Capacity (cmd), pc/h			7200	2200		
Initial Adjusted Capacity (cmda), pc/ł	า		7200	-		
Final Adjusted Capacity (cmda), pc/h			7200	2200		
Volume-to-Capacity Ratio (v/c)			0.65	0.39		
Speed and Density						
Upstream Equilibrium Distance (LEQ	), ft	6942.7	Flow Outer Lanes (vOA), pc/h/h	n	1518	
Downstream Equilibrium Distance (L	EQ), ft	-	Off-Ramp Influence Area Spee	d (SR), mi/h	63.1	
Flow in Lanes 1 and 2 (v12), pc/h		3169	Outer Lanes Freeway Speed (S	0), mi/h	74.8	
Flow Entering Ramp-Infl. Area (vR12)	, pc/h	-	Ramp Junction Speed (S), mi/h	1	66.5	
Number of Outer Lanes on Freeway	(No), In	1	Average Density (D), pc/mi/ln		23.5	
Level of Service (LOS)		С	Density in Ramp Influence Are	a (DR), pc/mi/ln	27.2	

HCS Basic Freeway Report						
Project Information						
Segment Number	11	Segment Name	I-90 below SR-57			
Analysis Period Number	1	Segment Analysis Period	16:00-16:15			
Geometric Data						
Number of Lanes (N), In	3	Terrain Type	Level			
Segment Length (L), ft	2870	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.17			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors	•	•				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000			
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000			
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000			
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFcav	1.000			
Demand and Capacity						
Demand Volume (V), veh/h	3300	Heavy Vehicle Adjustment Factor (fHV)	0.926			
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1264			
Total Trucks, %	8.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400			
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400			
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.53			
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.1			
Total Ramp Density Adjustment	-	Level of Service (LOS)	С			
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0					

	ŀ	ICS Freeway	y V	Veaving Repo	ort	
Project Information	_					
Segment Number		12		Segment Name		I-90 b/w SR-57 and SR-2 Weave
Analysis Period Number		1		Segment Analysis Pe	riod	16:00-16:15
Geometric Data						
Number of Lanes (N), In		4		Segment Type		Freeway
Segment Length (Ls), ft		4300		Number of Maneuve	r Lanes (NwL), İn	0
Weaving Configuration	1	Two-Sided		Ramp-to-Freeway La	ne Changes (LCRF), lc	1
Terrain Type	$\neg$	Level		Freeway-to-Ramp La	ne Changes (LCFR), lc	1
Percent Grade, %		-		Ramp-to-Ramp Lane	Changes (LCRR), lc	2
Interchange Density (ID), int/mi		0.67		Cross Weaving Mana	ged Lane	No
Adjustment Factors				<u>.</u>		• •
Driver Population	1	All Familiar		Final Speed Adjustme	ent Factor (SAF)	1.000
Weather Type		Non-Severe Weather		Demand Adjustment Factor (DAF)		1.000
Incident Type		No Incident		Capacity Adjustment Factor for CAVs, CAFCAV		1.000
Proportion of CAVs in Traffic Stream		0		Final Capacity Adjust	ment Factor (CAF)	1.000
Demand and Capacity				а		
		FF		RF	RR	FR
Demand Volume (Vi), veh/h	229	0	113	30	90	1010
Peak Hour Factor (PHF)	0.94	1	0.9	4	0.94	0.94
Total Trucks, %	10.0	00	10.	00	10.00	10.00
Heavy Vehicle Adjustment Factor (fHV)	0.90	)9	0.9	09	0.909	0.909
Flow Rate (vi), pc/h	268	0	132	22	105	1182
Weaving Flow Rate (vw), pc/h	105		lde	al Conditions Capacity	/ (cIFL), pc/h/ln	2400
Non-Weaving Flow Rate (vNW), pc/h	518	4	De	nsity-Based Capacity (	cIWL × N × fHV), veh/h	8279
Total Flow Rate (v), pc/h	528	9	De	mand Flow-Based Cap	oacity (cIW × fHV), veh/h	-
Volume Ratio (VR)	0.02	20	We	eaving Area Capacity (cw), veh/h		8279
Minimum Lane Change Rate (LCMIN), lc/h	210		Ad	djusted Weaving Area Capacity (cwA), veh/h		8279
Maximum Weaving Length (LMAX), ft	591	2	Vo	olume-to-Capacity Ratio (v/c)		0.58
Speed and Density						
Non-Weaving Vehicle Index (INW)	Т	1494	Average Weaving Speed (Sw), mi/h			61.1
Non-Weaving Lane Change Rate (LCNW), lc,	:/h	2693		Average Non-Weavir	ng Speed (SNW), mi/h	62.1
Weaving Lane Change Rate (LCw), lc/h		805		Average Speed (S), m	ni/h	62.1
Weaving Lane Change Rate (LCAII), lc/h		3498		Density (D), pc/mi/ln		21.3
Weaving Intensity Factor (W)		0.192		Level of Service (LOS)	)	с

	HCS Basic F	reeway Report	
Project Information			
Segment Number	13	Segment Name	SR-2 West of I-90/SR-2 Diverge
Analysis Period Number	1	Segment Analysis Period	16:00-16:15
Geometric Data			
Number of Lanes (N), In	3	Terrain Type	Level
Segment Length (L), ft	5000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	1.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	3420	Heavy Vehicle Adjustment Factor (fHV)	0.943
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	1286
Total Trucks, %	6.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.54
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	69.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

HCS WW Freeways version 2020 I-90 WB 2045 PM - OPTION 3.xuf

### HCS Basic Freeway Report

### Project Information

Project Information			
Analyst	GSH	Date	2/17/2023
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	AM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Geometric Data			
Number of Lanes (N), In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	580	Heavy Vehicle Adjustment Factor (fHV)	0.730
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	422
Total Trucks, %	37.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.18
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	6.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

I-90 WB W of SR2 Basic 2045 AM - OPTION 2 AND 3.xuf

### HCS Basic Freeway Report

### Project Information

Project Information			
Analyst	GSH	Date	2/17/2023
Agency	CMT	Analysis Year	2045
Jurisdiction	ODOT District 3	Time Analyzed	PM DHV
Project Description	PID 107714 LOR-90-10.76	Units	U.S. Customary
Geometric Data			
Number of Lanes (N), In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	70.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Demand Adjustment Factor (DAF)	1.000
Incident Type	No Incident	Final Capacity Adjustment Factor (CAF)	1.000
Proportion of CAVs in Traffic Stream	0	Capacity Adj. Factor for CAVs, CAFCAV	1.000
Demand and Capacity			
Demand Volume (V), veh/h	1100	Heavy Vehicle Adjustment Factor (fHV)	0.730
Peak Hour Factor (PHF)	0.94	Flow Rate (vp), pc/h/ln	802
Total Trucks, %	37.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Initial Adjusted Capacity (cadj), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Final Adjusted Capacity (cadj), pc/h/ln	2400
Passenger Car Equivalent (ET)	2.00	Volume-to-Capacity Ratio (v/c)	0.33
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	11.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	70.0		

I-90 WB W of SR2 Basic 2045 PM - OPTION 2 AND 3.xuf

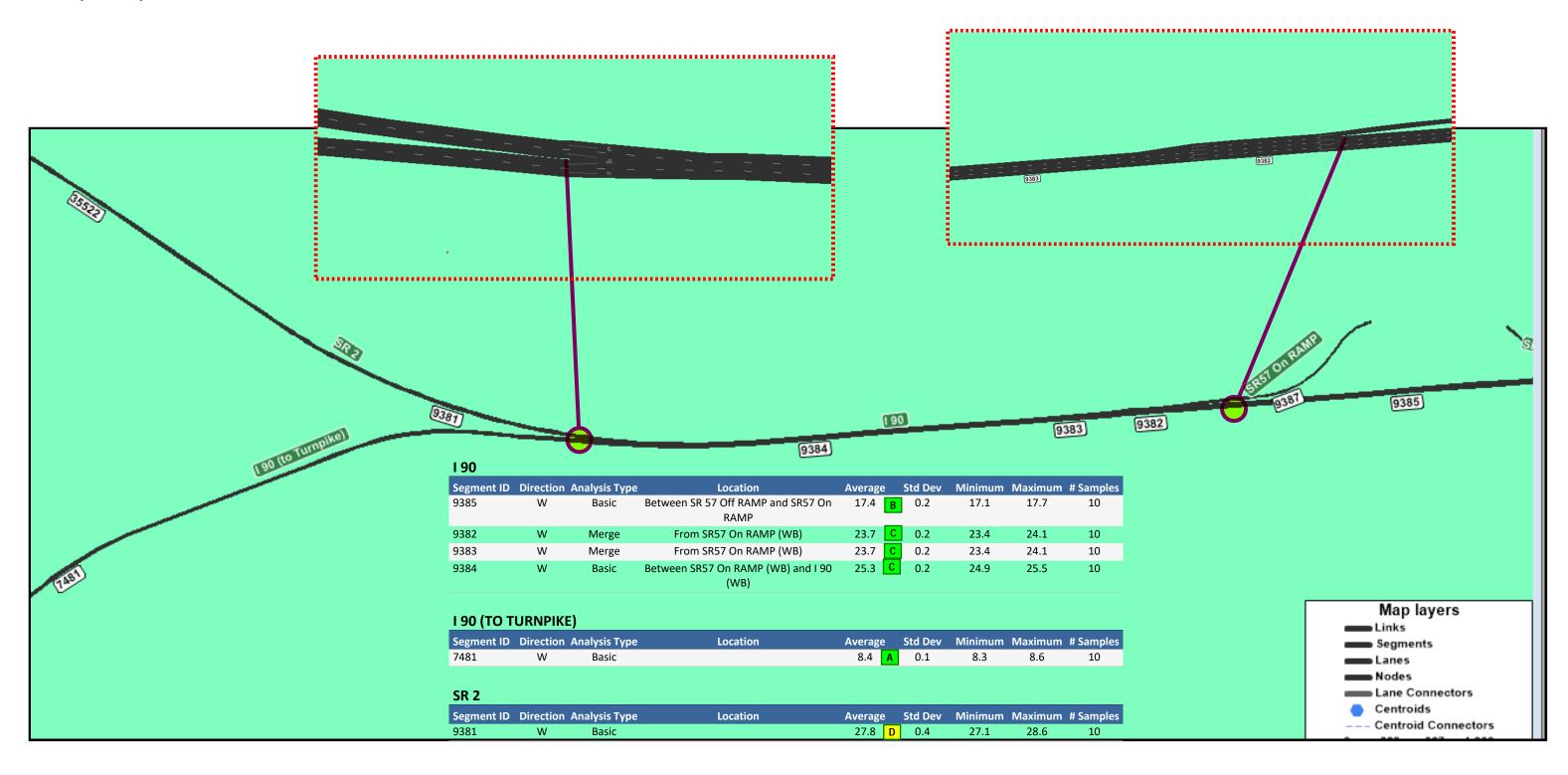
INTERCHANGE OPERATIONS STUDY LOR-90-10.76

APPENDIX C: TRANSMODELER CAPACITY ANALYSIS



### I-90 WB "weaving movement" between SR57 merge & I-90/SR major diverge

TransModeler was run to verify operations between the proposed lane configuration for the section of I-90WB, between the SR57 Entrance Ramp and the Major diverge of SR2 and I-90. TransModeler shows acceptable operations.



Project:ElyriaScenario:2045 PM BuildRun(s):Batch (10 runs)Simulated:VariousTime:17:00:00 - 18:00:00Interval:SummarySelection:Weave -WB SR2/I-90 E. of SR57 t

### Freeway Segment Level of Service - Overview

#### 190

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - Between SR 57 Off RAMP and SR57 Or	n RAMP - WB			Segment: 9385
	1	17.1	No	В
	2	17.6	No	В
	3	17.4	No	В
	4	17.7	No	В
	5	17.3	No	В
	6	17.1	No	В
	7	17.5	No	В
	8	17.4	No	В
	9	17.7	No	В
	10	17.6	No	В
	Average:	17.4	No	В
Merge - From SR57 On RAMP (WB) - WB				Segment: 9382
	1	24.1	No	С
	2	23.5	No	С

Average:	23.7	No	С
10	23.4	No	С
9	23.5	No	С
8	23.8	No	С
7	23.6	No	С
6	23.8	No	С
5	23.6	No	С
4	23.4	No	С
3	23.9	No	С

Merge - From SR57 On RAMP (WB) - WB				Segment: 9383
	1	24.1	No	С
	2	23.5	No	С
	3	23.9	No	С
	4	23.4	No	С
	5	23.6	No	С
	6	23.8	No	С
	7	23.6	No	С
	8	23.8	No	С
	9	23.5	No	С

190				
	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Merge - From SR57 On RAMP (WB) - WB				Segment: 9383
	10	23.4	No	С
	Average:	23.7	No	C
Basic - Between SR57 On RAMP (WB) and I 90	) (WB) - WB			Segment: 9384
	1	25.4	No	С
	2	25.5	No	С
	3	25.1	No	С
	4	25.4	No	С
	5	24.9	No	С
	6	25.4	No	С
	7	25.2	No	С
	8	24.9	No	С
	9	25.4	No	С
	10	25.5	No	С
	Average:	25.3	No	С

### I 90 (TO TURNPIKE)

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - WB				Segment: 7481
	1	8.5	No	А
	2	8.4	No	А
	3	8.4	No	А
	4	8.6	No	А
	5	8.5	No	А
	6	8.4	No	А
	7	8.3	No	А
	8	8.4	No	А
	9	8.4	No	А
	10	8.3	No	А
	Average:	8.4	No	Α

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - WB				Segment: 9381
	1	27.8	No	D
	2	28.0	No	D
	3	28.6	No	D
	4	27.1	No	D
	5	28.2	No	D
	6	27.9	No	D
	7	27.9	No	D
	8	27.9	No	D

#### SR 2

	Run	Density (pc/mi/ln)	Over Capacity	Level of Service
Basic - WB				Segment: 9381
	9	27.7	No	D
	10	27.2	No	D
	Average:	27.8	No	D

ABOUT FREEWAY LOS The LOS determination based on density will be overridden with LOS F when demand exceeds capacity (i.e., Over Capacity = Yes).

Project:ElyriaScenario:2045 PM BuildRun(s):Batch (10 runs)Simulated:VariousTime:17:00:00 - 18:00:00Interval:SummarySelection:Weave -WB SR2/I-90 E. of SR57 t

### Freeway Segment Level of Service - Density

#### 190

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
9385	W	Basic	Between SR 57 Off RAMP and SR57 On RAMP	17.4 <mark>B</mark>	0.2	17.1	17.7	10
9382	W	Merge	From SR57 On RAMP (WB)	23.7 C	0.2	23.4	24.1	10
9383	W	Merge	From SR57 On RAMP (WB)	23.7 <mark>C</mark>	0.2	23.4	24.1	10
9384	W	Basic	Between SR57 On RAMP (WB) and I 90 (WB)	25.3 C	0.2	24.9	25.5	10

#### I 90 (TO TURNPIKE)

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
7481	W	Basic		8.4 A	0.1	8.3	8.6	10

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
9381	W	Basic		27.8 <mark>D</mark>	0.4	27.1	28.6	10

Project:ElyriaScenario:2045 PM BuildRun(s):Batch (10 runs)Simulated:VariousTime:17:00:00 - 18:00:00Interval:Summary

Selection: Weave -WB SR2/I-90 E. of SR57 t

### Freeway Segment Level of Service - VgtC

#### 190

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
9385	W	Basic	Between SR 57 Off RAMP and SR57 On RAMP	0.0	0.0	0.0	0.0	10
9382	W	Merge	From SR57 On RAMP (WB)	0.0	0.0	0.0	0.0	10
9383	W	Merge	From SR57 On RAMP (WB)	0.0	0.0	0.0	0.0	10
9384	W	Basic	Between SR57 On RAMP (WB) and I 90 (WB)	0.0	0.0	0.0	0.0	10

#### I 90 (TO TURNPIKE)

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
7481	W	Basic		0.0	0.0	0.0	0.0	10

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
9381	W	Basic		0.0	0.0	0.0	0.0	10

Project:ElyriaScenario:2045 PM BuildRun(s):Batch (10 runs)Simulated:VariousTime:17:00:00 - 18:00:00Interval:SummarySelection:Weave -WB SR2/I-90 E. of SR57 t

### Freeway Segment Level of Service - Over Capacity

#### 190

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
9385	W	Basic	Between SR 57 Off RAMP and SR57 On RAMP	0.0	0.0	0.0	0.0	10
9382	W	Merge	From SR57 On RAMP (WB)	0.0	0.0	0.0	0.0	10
9383	W	Merge	From SR57 On RAMP (WB)	0.0	0.0	0.0	0.0	10
9384	W	Basic	Between SR57 On RAMP (WB) and I 90 (WB)	0.0	0.0	0.0	0.0	10

#### I 90 (TO TURNPIKE)

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
7481	W	Basic		0.0	0.0	0.0	0.0	10

Segment ID	Direction	Analysis Type	Location	Average	Std Dev	Minimum	Maximum	# Samples
9381	W	Basic		0.0	0.0	0.0	0.0	10