SUM-8-0.00

APPENDIX

June 2020

Appendix A

Recommended Alternative Drawing

SUM-8-0.00 Corridor Study
(PID 106589)
PBPD Alternative
01/06/2020

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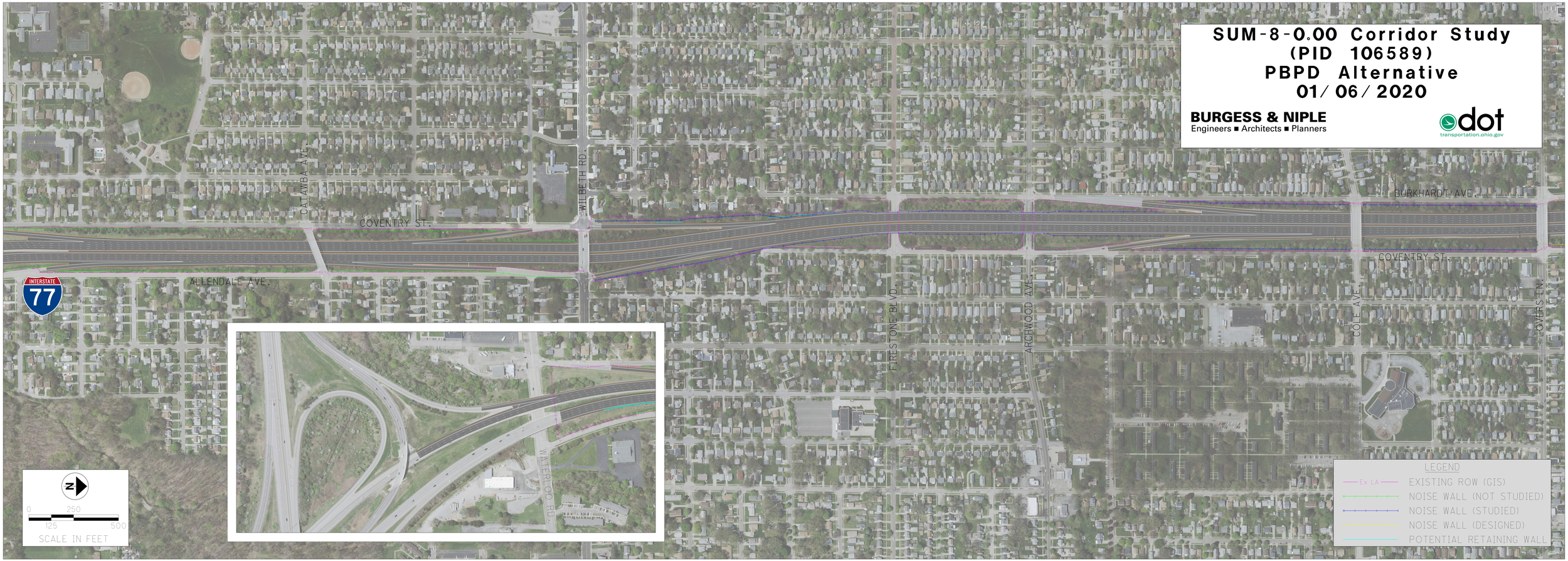

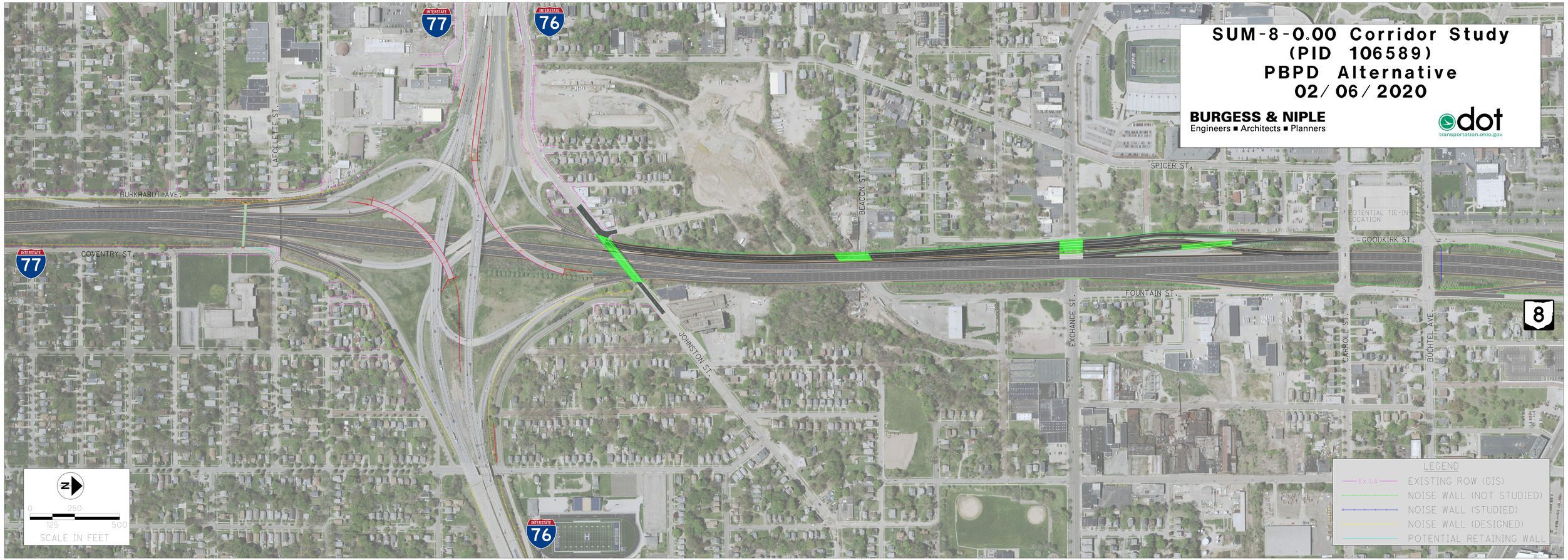
SUM-8-0.00 Corridor Study
(PID 106589)
PBPD Alternative
02/06/2020
BURGESS & NIPLE
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transportation.ohio.gov
INTERSTATE 77
INTERSTATE 76
LAFOLLETTE ST.
BURKHARDT AVE.
COVENTRY ST.
BEACON ST.
SPICER ST.
POTENTIAL TIE-IN LOCATION
GOODKIRK ST.
FOUNTAIN ST.
EXCHANGE ST.
JOHNSTON ST.
CARROLL ST.
BUCHTEL AVE.
8
N
0
250
125
500
SCALE IN FEET
LEGEND
EXISTING ROW (GIS)
NOISE WALL (NOT STUDIED)
NOISE WALL (STUDIED)
NOISE WALL (DESIGNED)
POTENTIAL RETAINING WALL

SUM-8-0.00 Corridor Study
(PID 106589)
PBPD Alternative
01/06/2020
BURGESS & NIPLE
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8
POTENTIAL TIE-IN LOCATION
GOODKIRK ST.
FOUNTAIN ST.
BUCHTEL AVE.
MARKET ST.
FORGE ST.
PERKINS ST.
GLENWOOD AVE.
8
N
0
250
125
500
SCALE IN FEET
LEGEND
Ex LA
EXISTING ROW (GIS)
NOISE WALL (NOT STUDIED)
NOISE WALL (STUDIED)
NOISE WALL (DESIGNED)
POTENTIAL RETAINING WALL

Appendix B

Interim Build Alternative Drawing

SUM-8-0.00 Corridor Study
(PID 106589)
PBPD Alternative
4/23/2020

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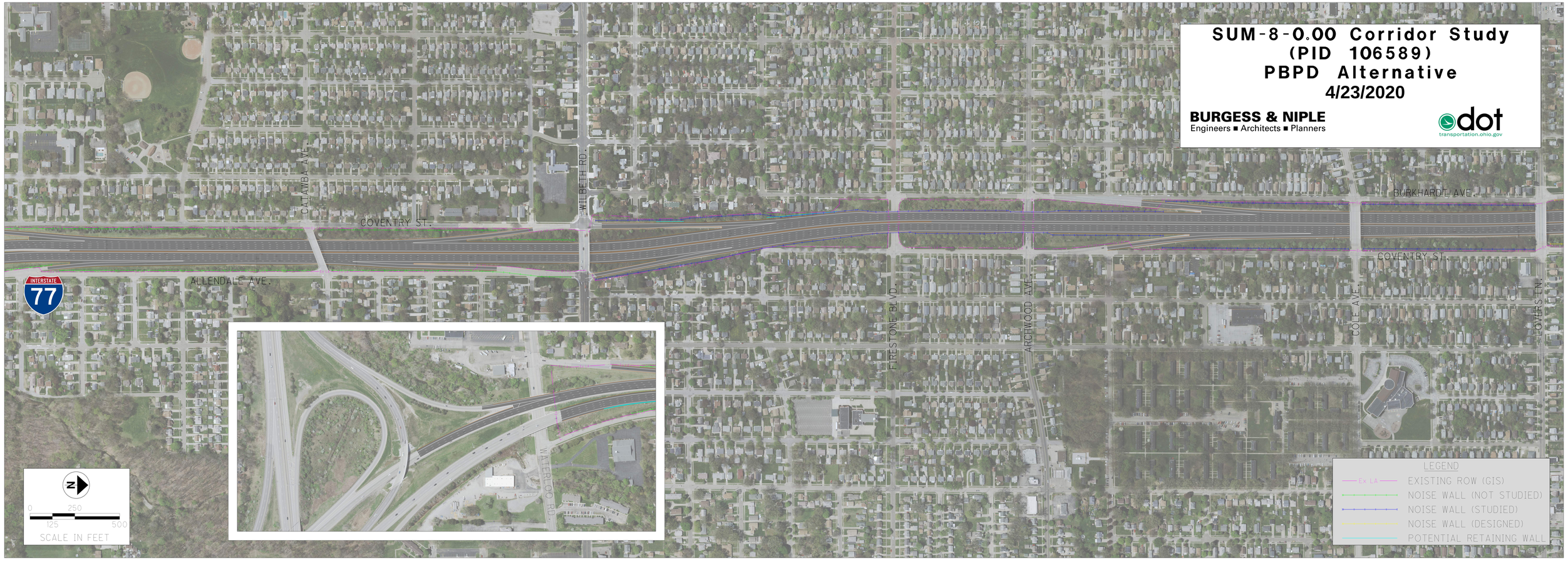

SUM-8-0.00 Corridor Study
(PID 106589)
PBPD Alternative
4/23/2020

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Appendix C

Conceptual Signing Plan

Appendix D

Certified Traffic

INTER-OFFICE COMMUNICATION

TO: **Michael Craver, District 4**

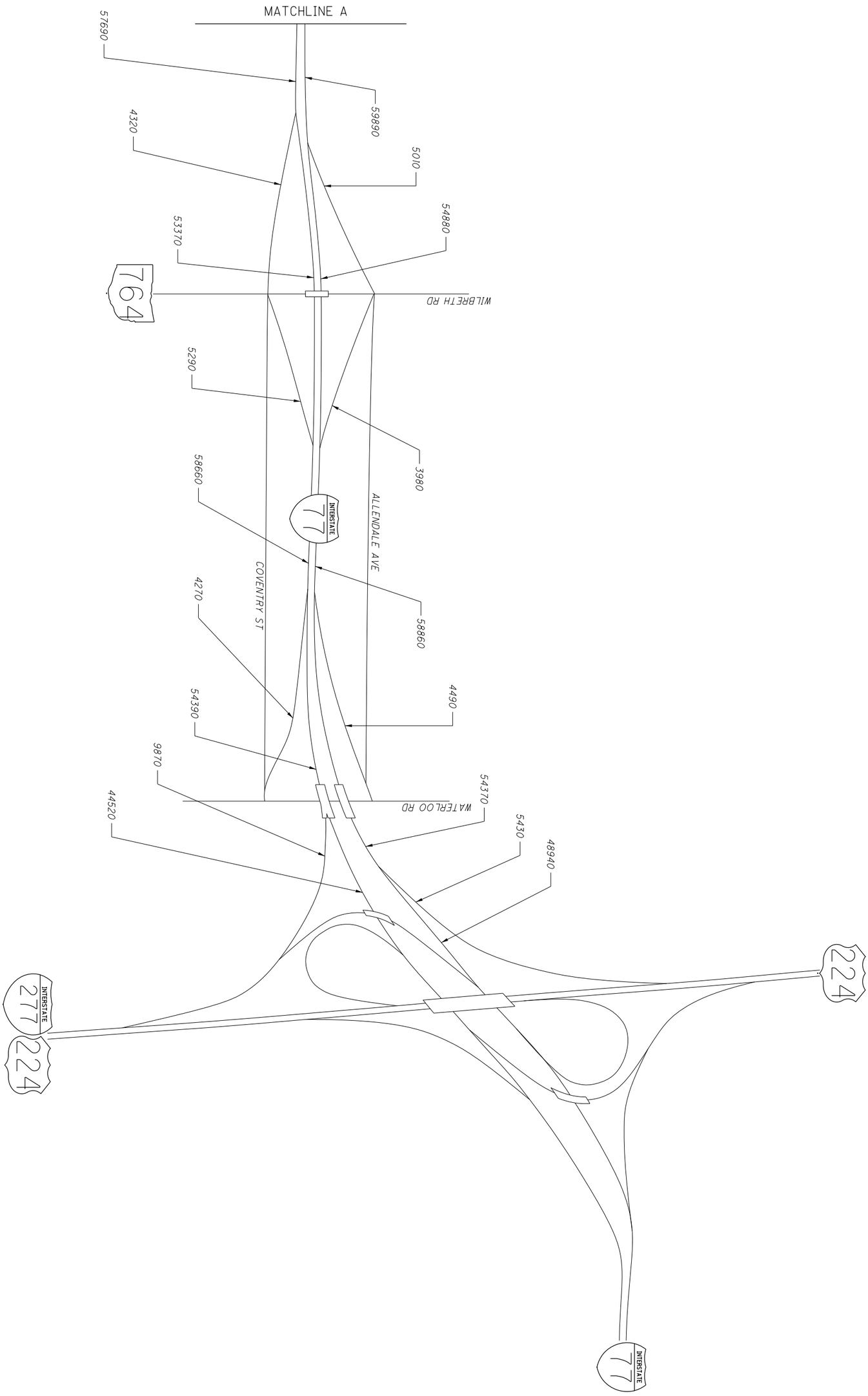
FROM: Bryan Raderstorf, Transportation Engineer, Division of Statewide Planning & Research, Modeling & Forecasting Section

SUBJECT: **SUM-8-0.00, PID 107834**

DATE: May 19, 2020

In reply to a request dated April 6, 2020, revised plates submitted have been reviewed and are reasonable for use. Attached are plates showing 2025/2045 ADT, PM DHV, AM DHV, and existing truck factors

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



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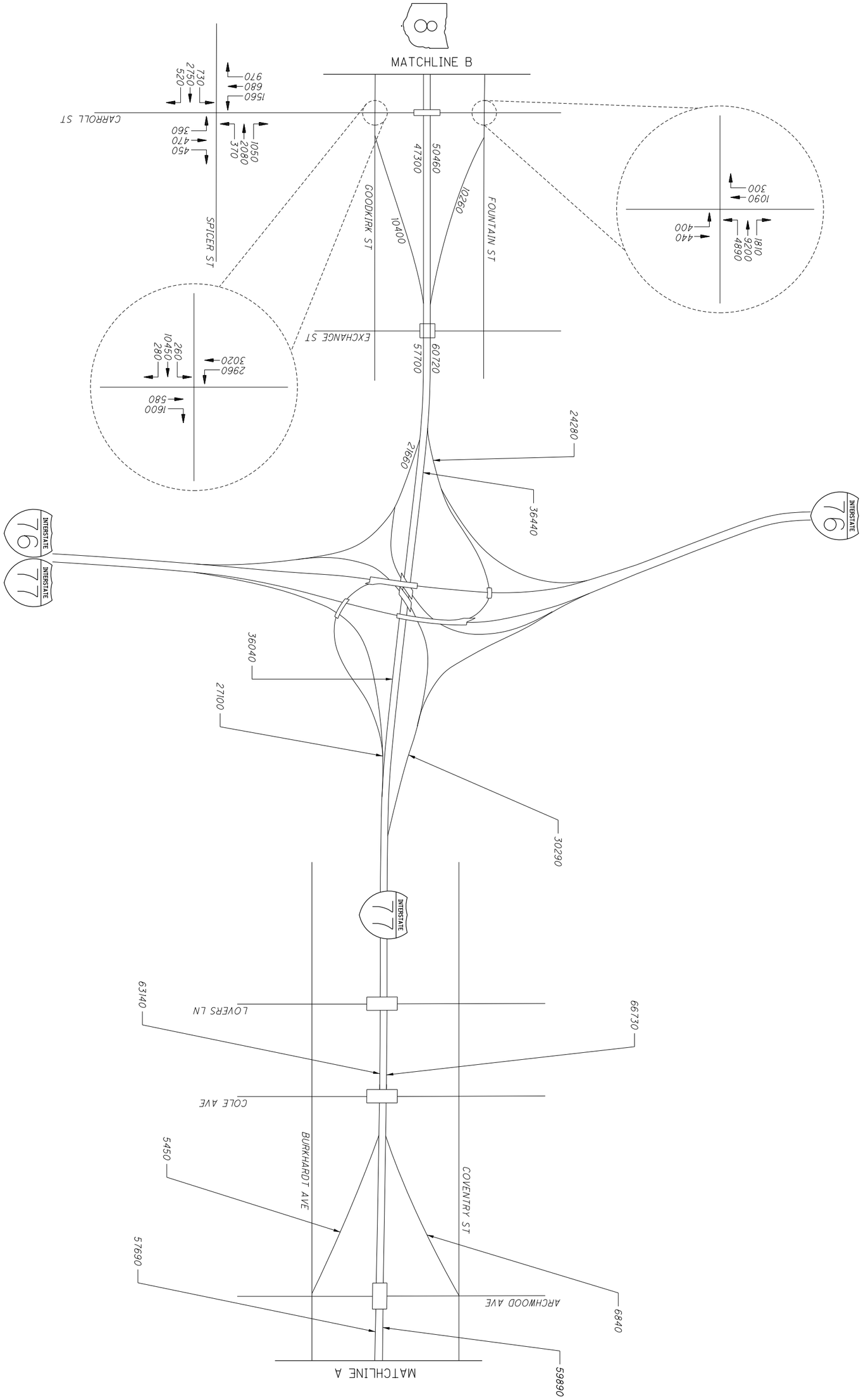

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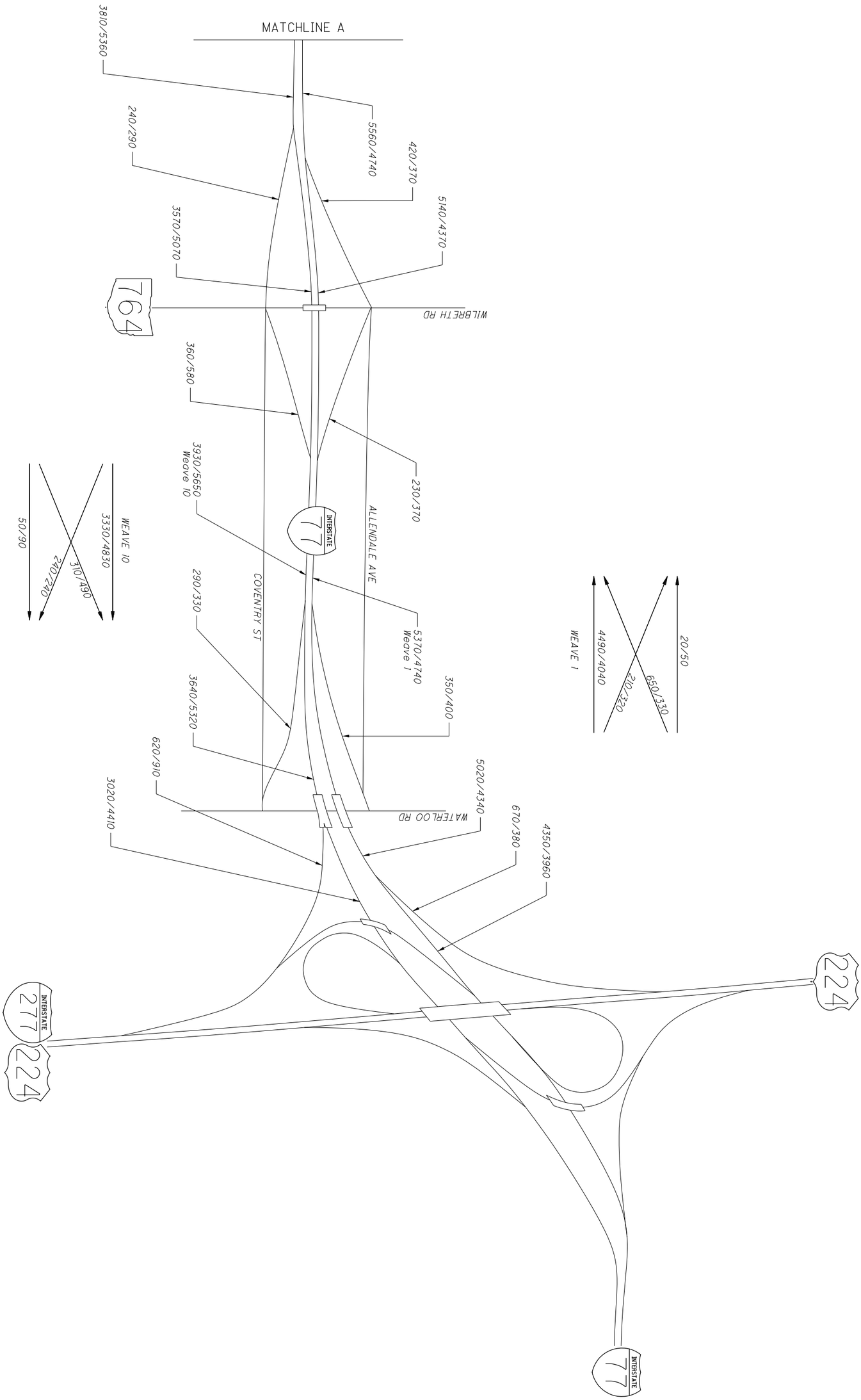
NOT TO SCALE

ANALYST RMK
DATE 04/03/20

SUM-8-0.00 CORRIDOR STUDY
2019 EXISTING ADT

PID 107834



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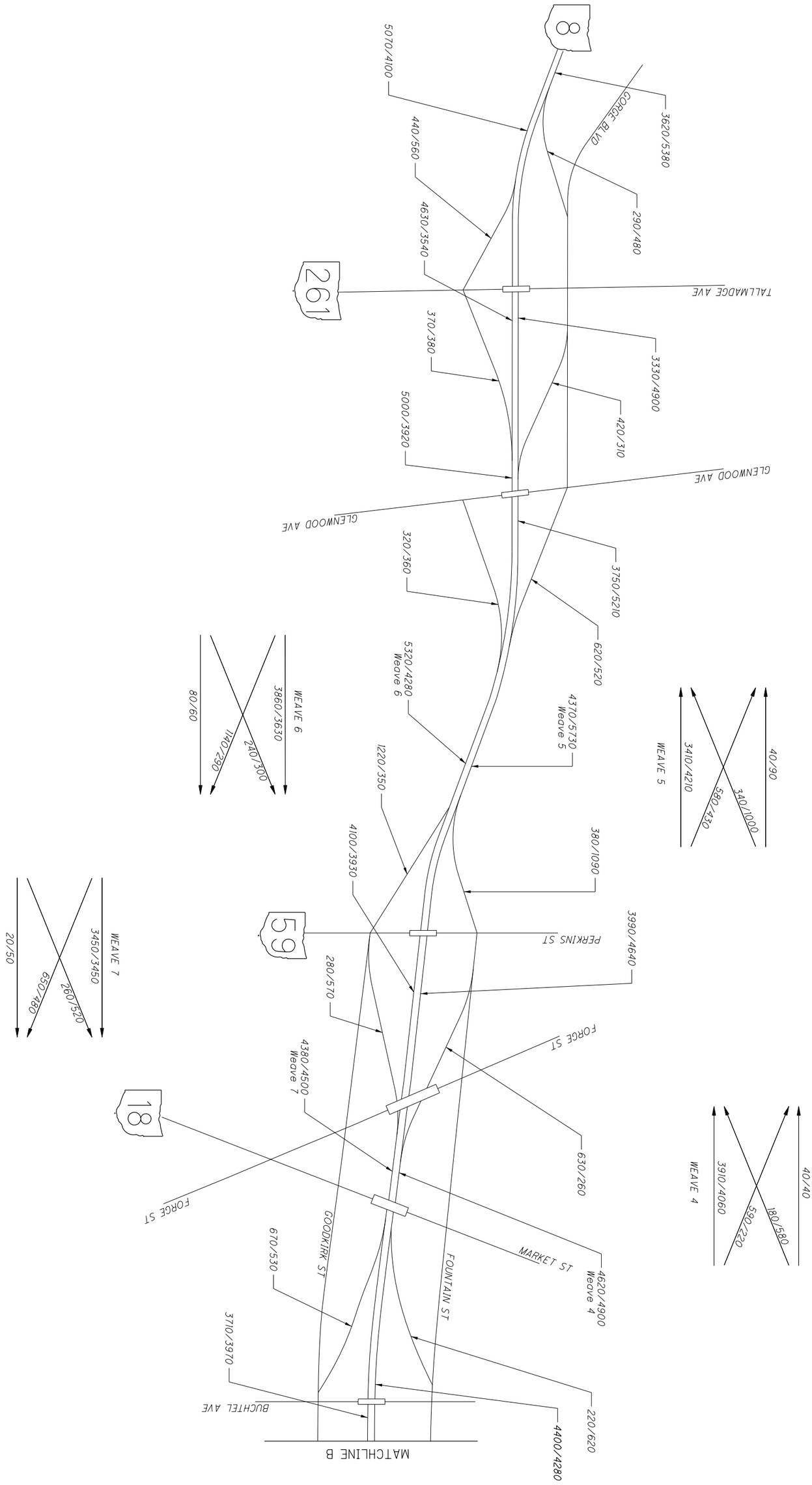
ANALYST RMK
DATE 04/03/20

SUM-8-0.00 CORRIDOR STUDY
2019 EXISTING AM/PM PEAK HOUR

PID 107834



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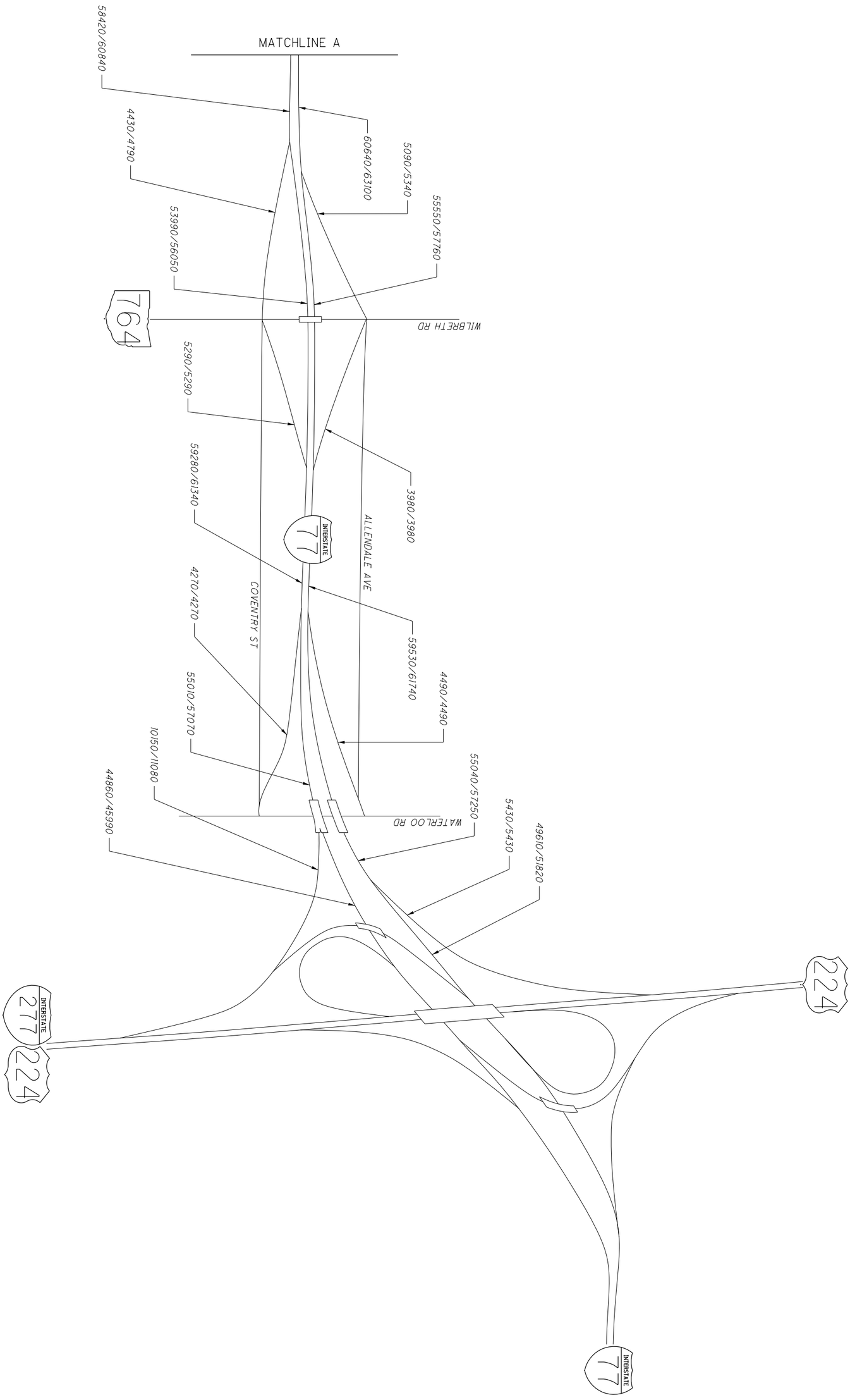

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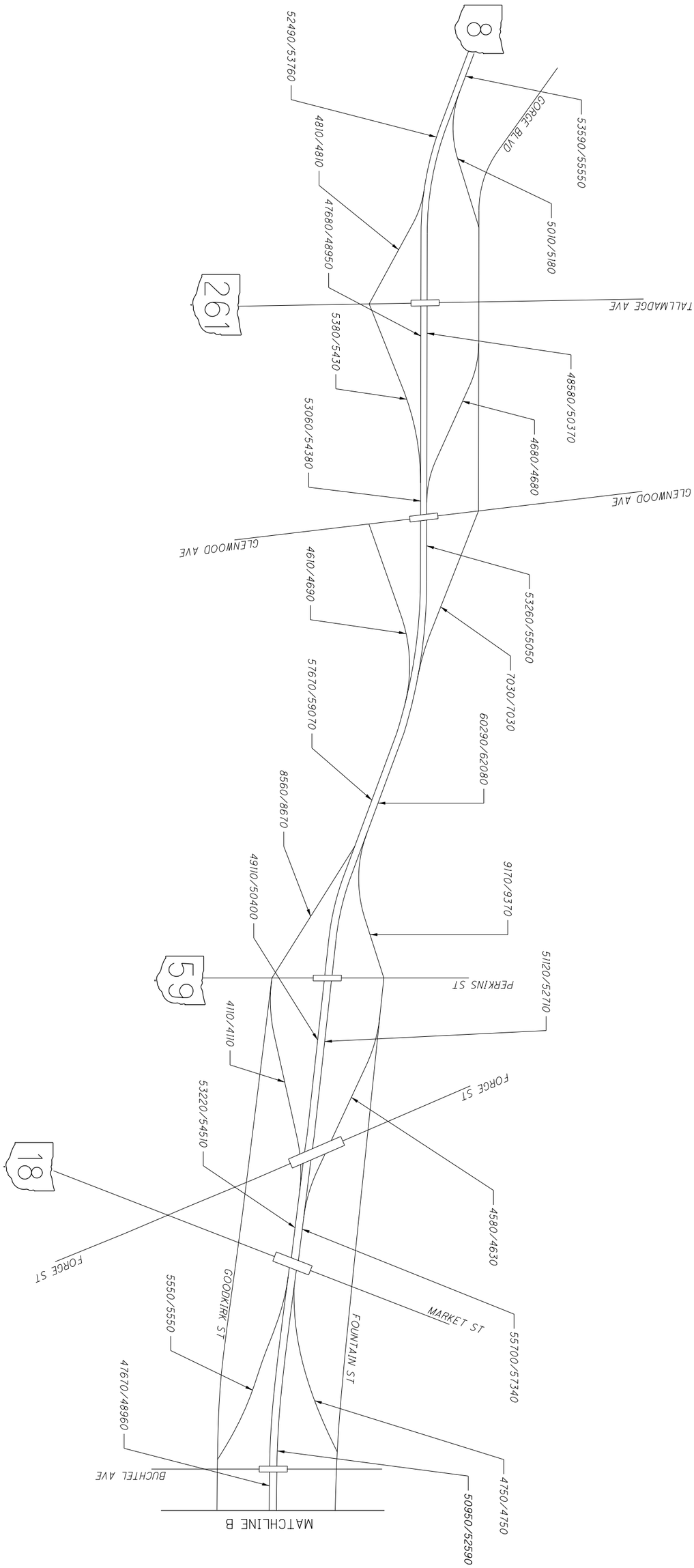
NOT TO SCALE

ANALYST RMK
DATE 04/03/20

SUM-8-0.00 CORRIDOR STUDY
2025/2045 ADT VOLUMES

PID 107834



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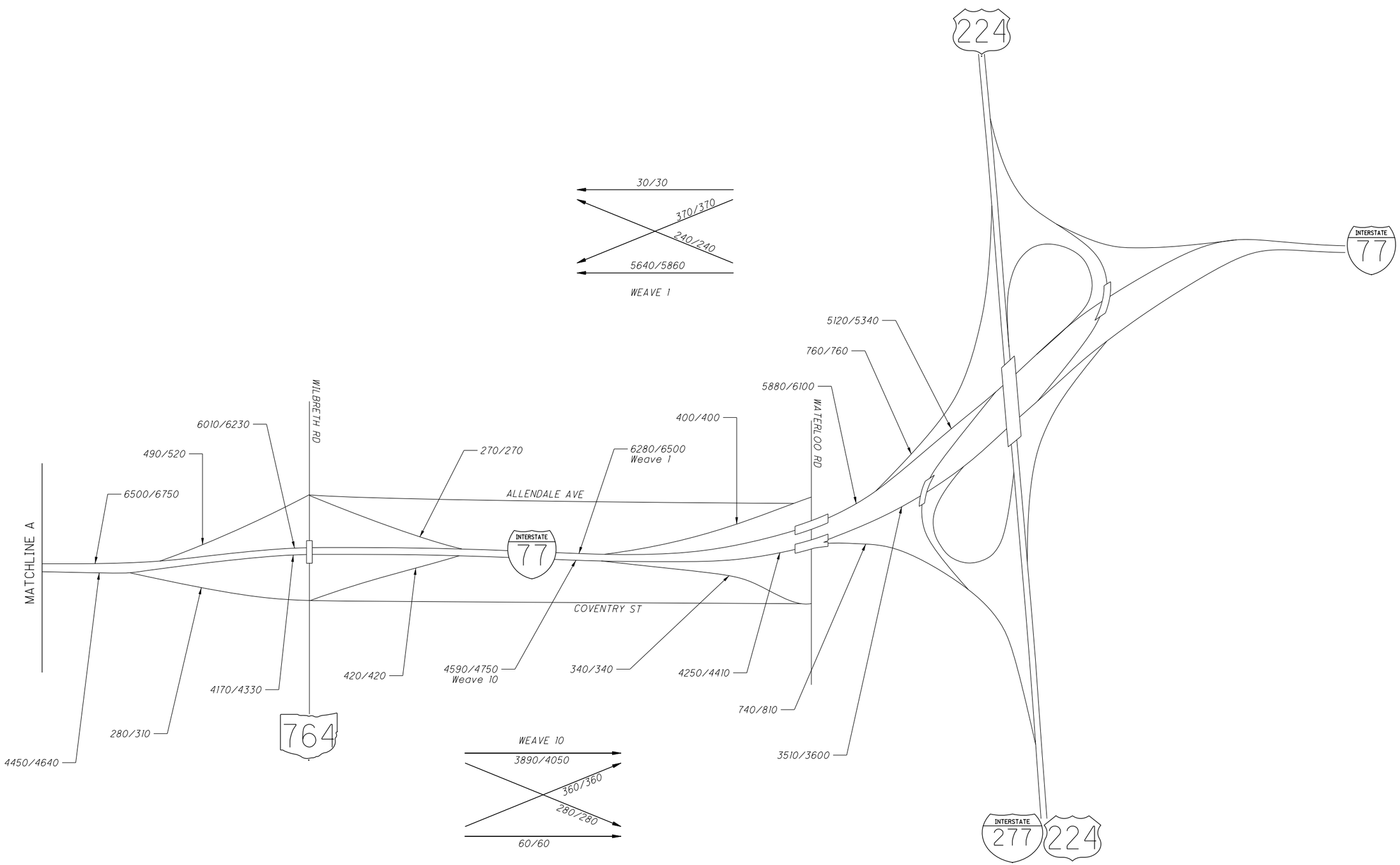


NOT TO SCALE

ANALYST RMK

DATE 04/03/20

SUM-8-0.00 CORRIDOR STUDY
2025/ 2045 AM PEAK VOLUMES

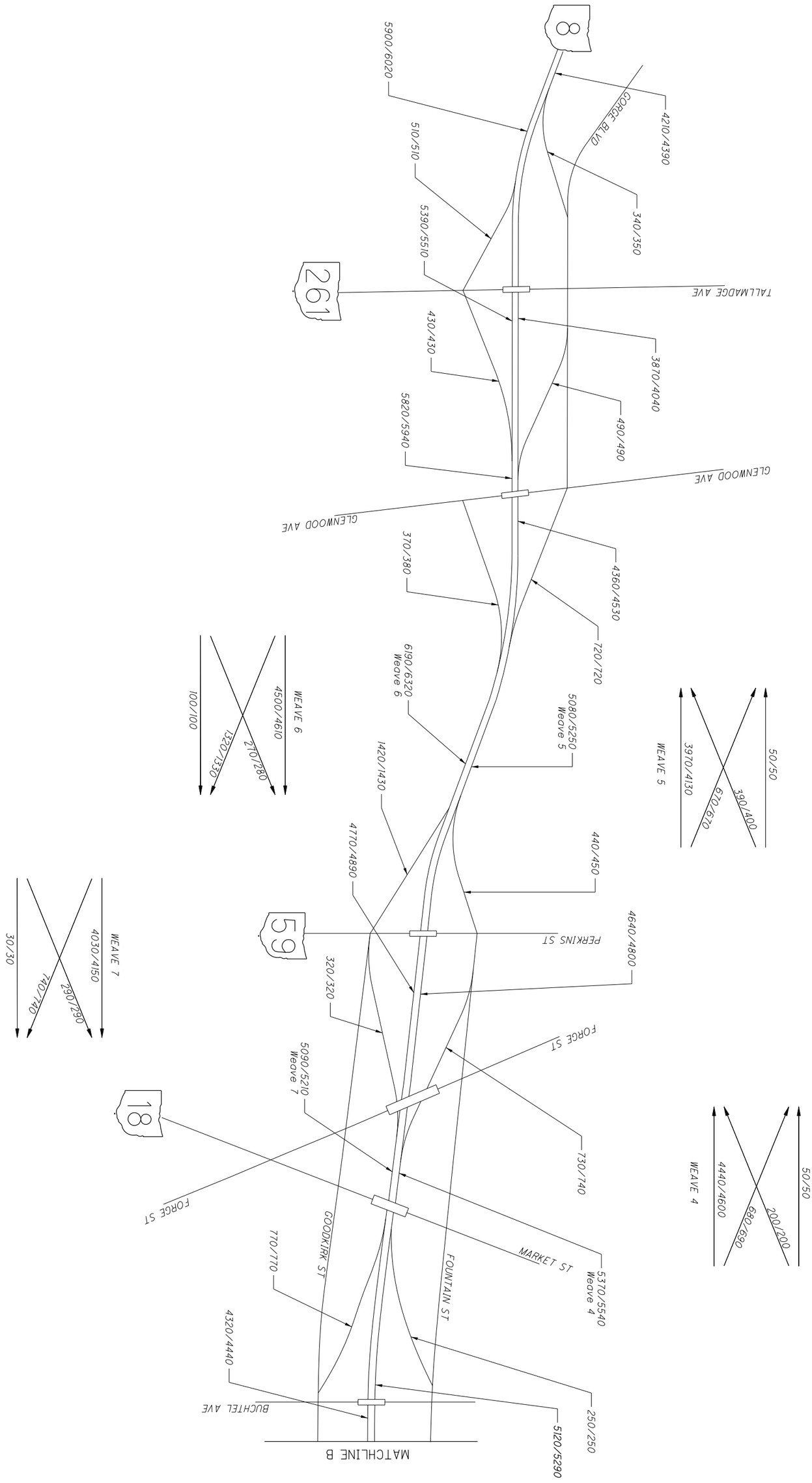
PID 107834

NOT TO SCALE

ANALYST RMK
DATE 04/03/20

SUM-8-0.00 CORRIDOR STUDY
2025 / 2045 AM PEAK VOLUMES

PID 107834



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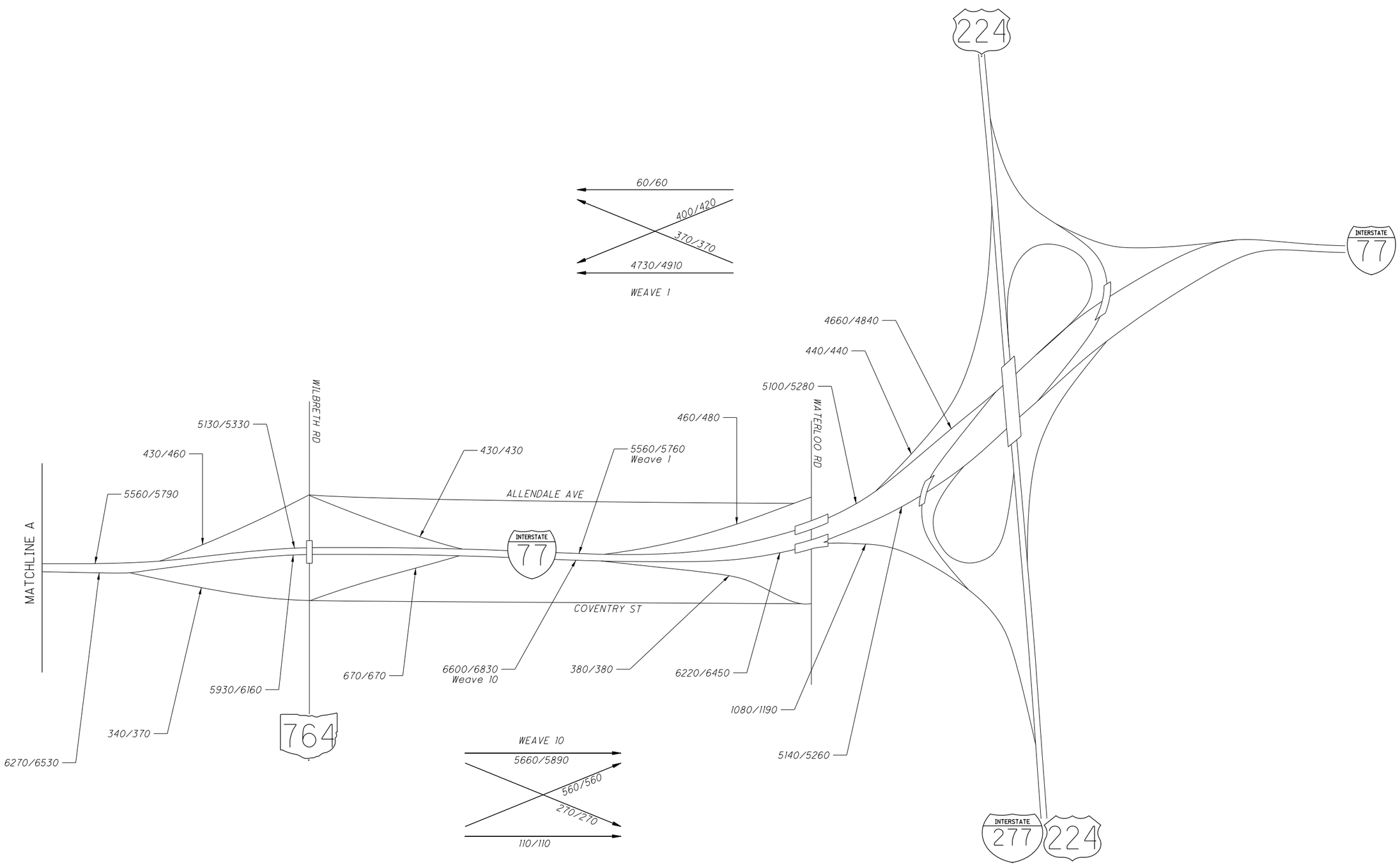

NOT TO SCALE

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2025 / 2045 PM PEAK VOLUMES

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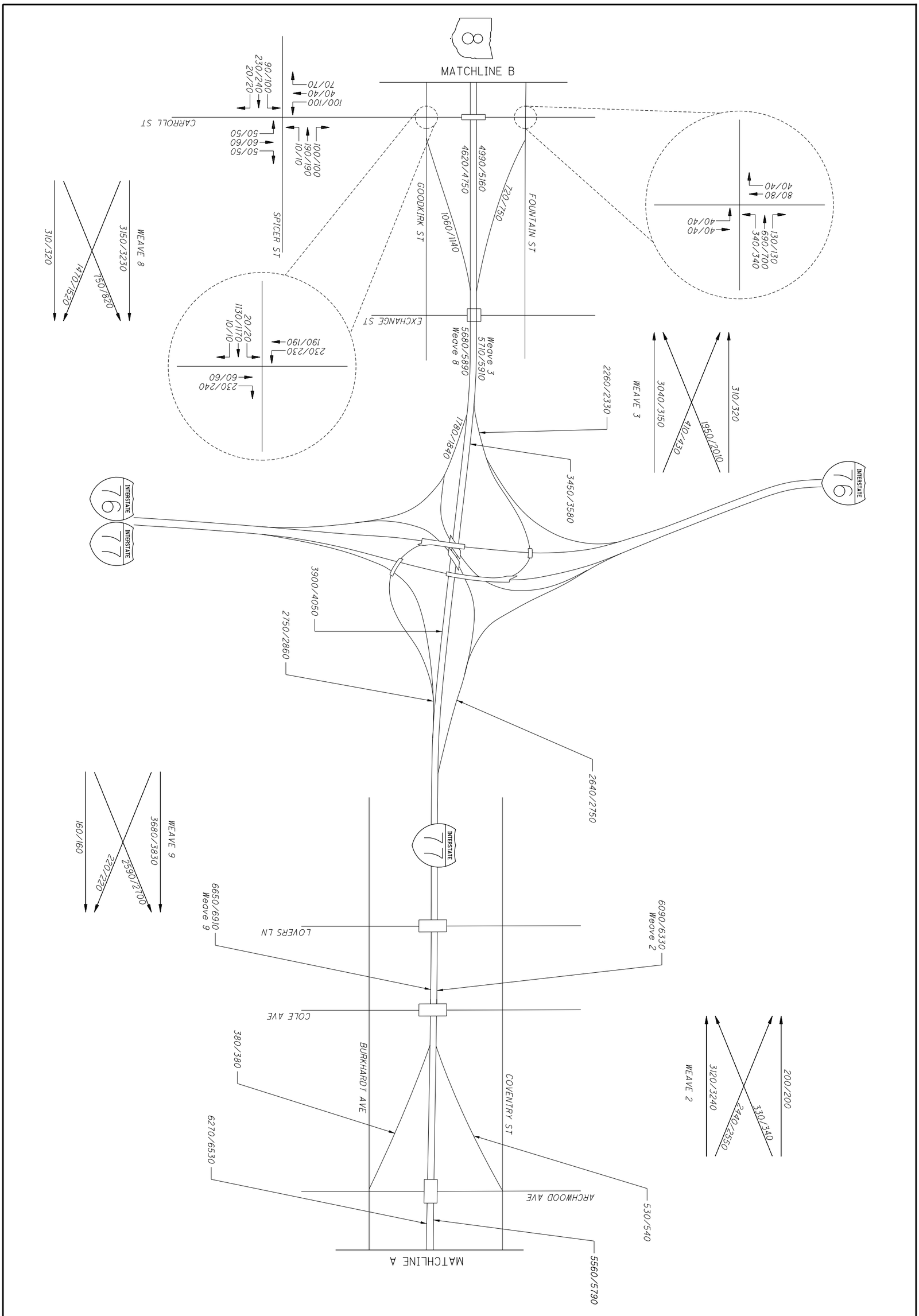

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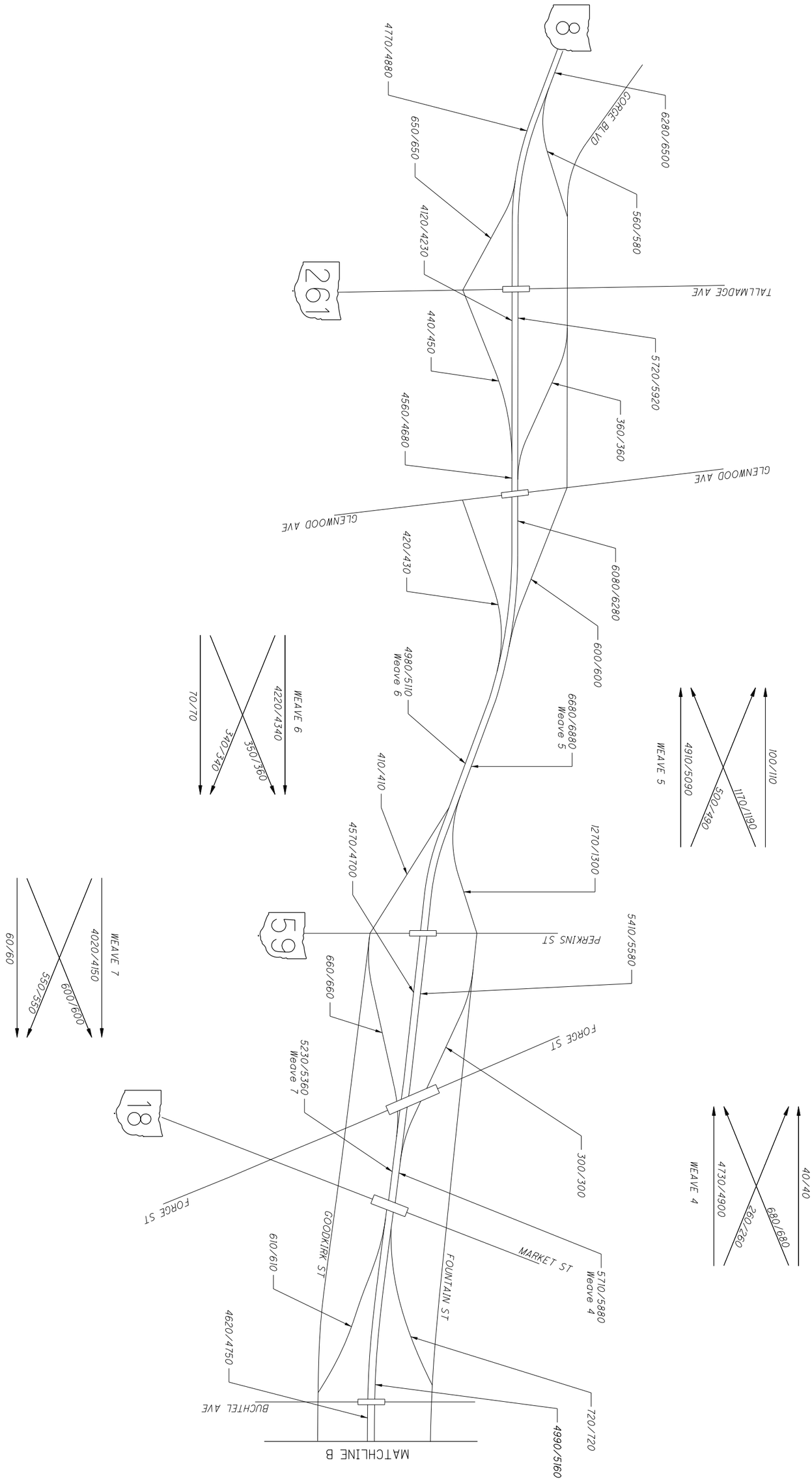

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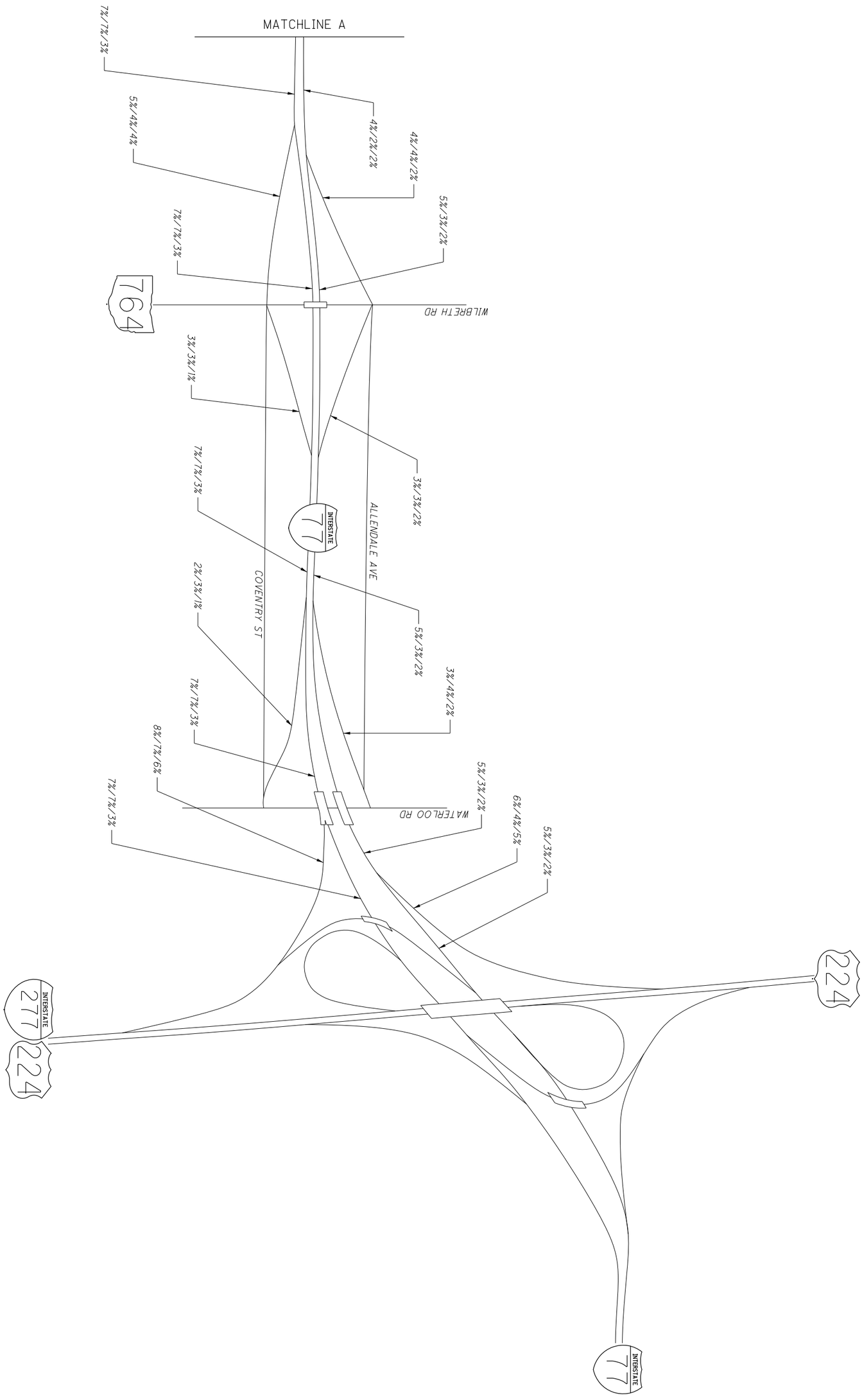

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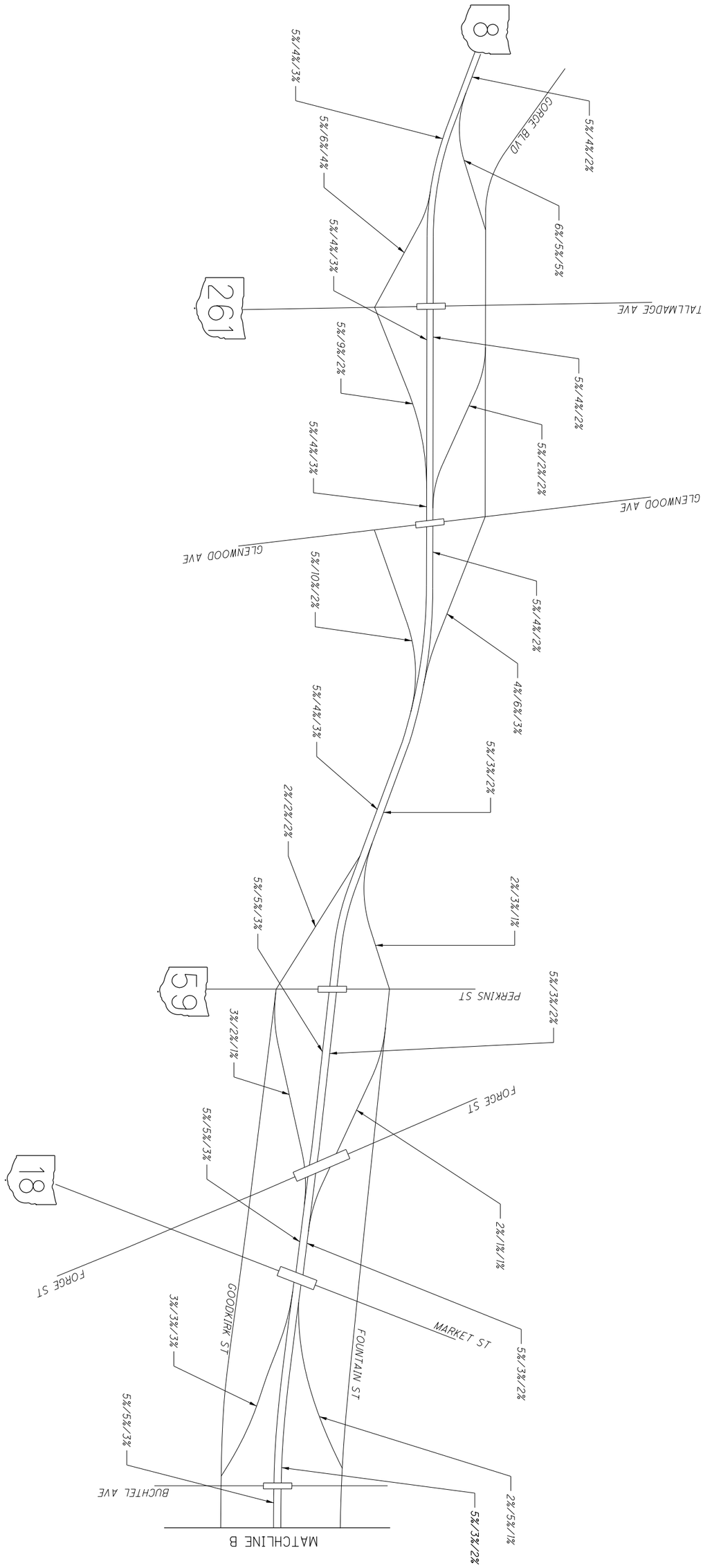
NOT TO SCALE

ANALYST RMK
DATE 04/03/20

SUM-8-0.00 CORRIDOR STUDY
T24/ AM/ PM TRUCK PERCENTAGES

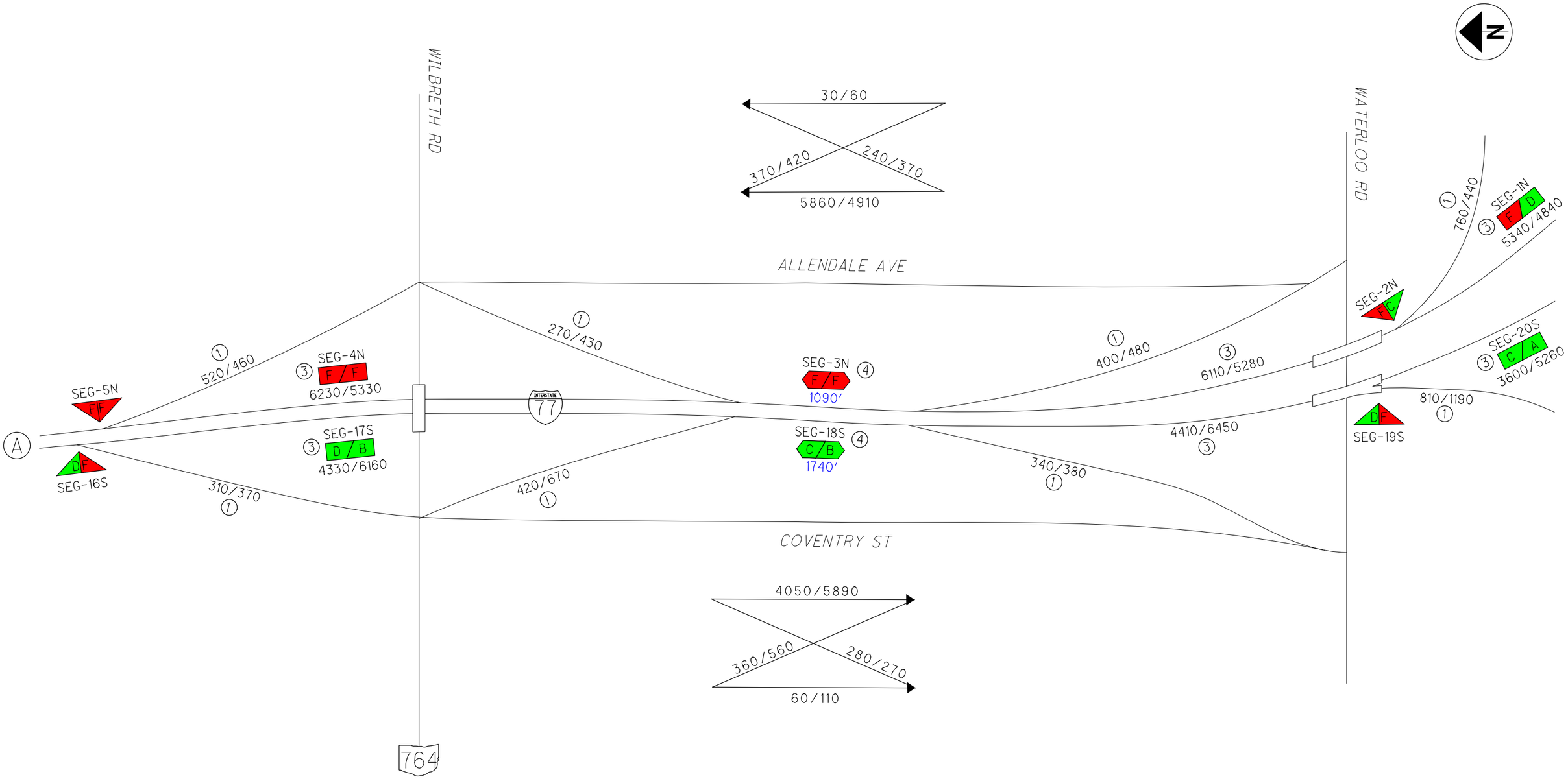
PID 107834



18 / 18	PID 107834	SUM-8-0.00 CORRIDOR STUDY T24/ AM/ PM TRUCK PERCENTAGES	ANALYST RMK DATE 04/03/20	NOT TO SCALE

Appendix E

No-Build Freeway Analysis



Text Style

AM/PM Traffic Volume

Weave Segment Short Length

(X) = # of Lanes

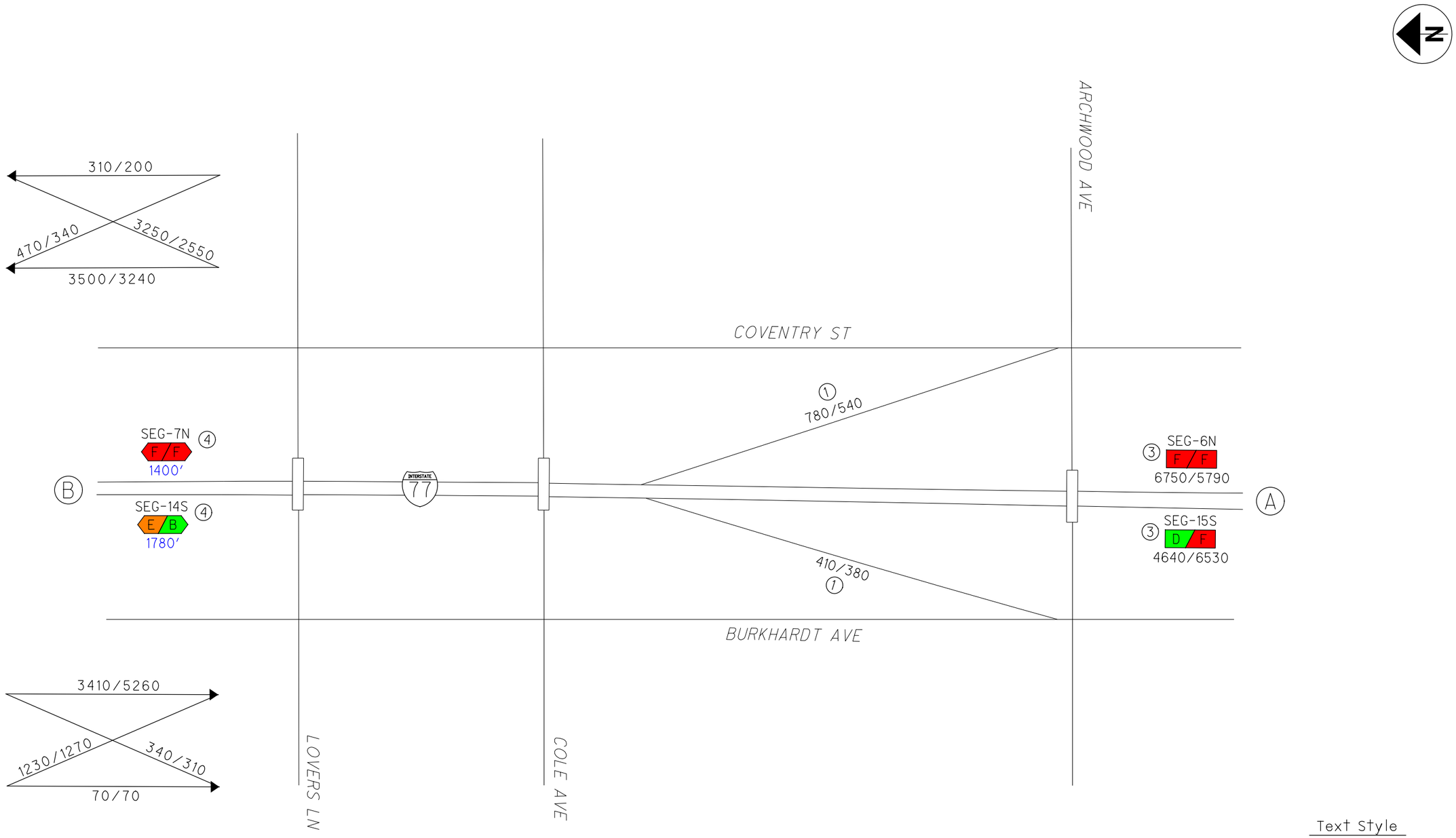
Location Type

- Freeway Segment
- Weave Segment
- Merge/Diverge

LOS Guide

- LOS A - D
- LOS E
- LOS F

LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM NO-BUILD



Text Style

AM/PM Traffic Volume

Weave Segment Short Length

(X) = # of Lanes

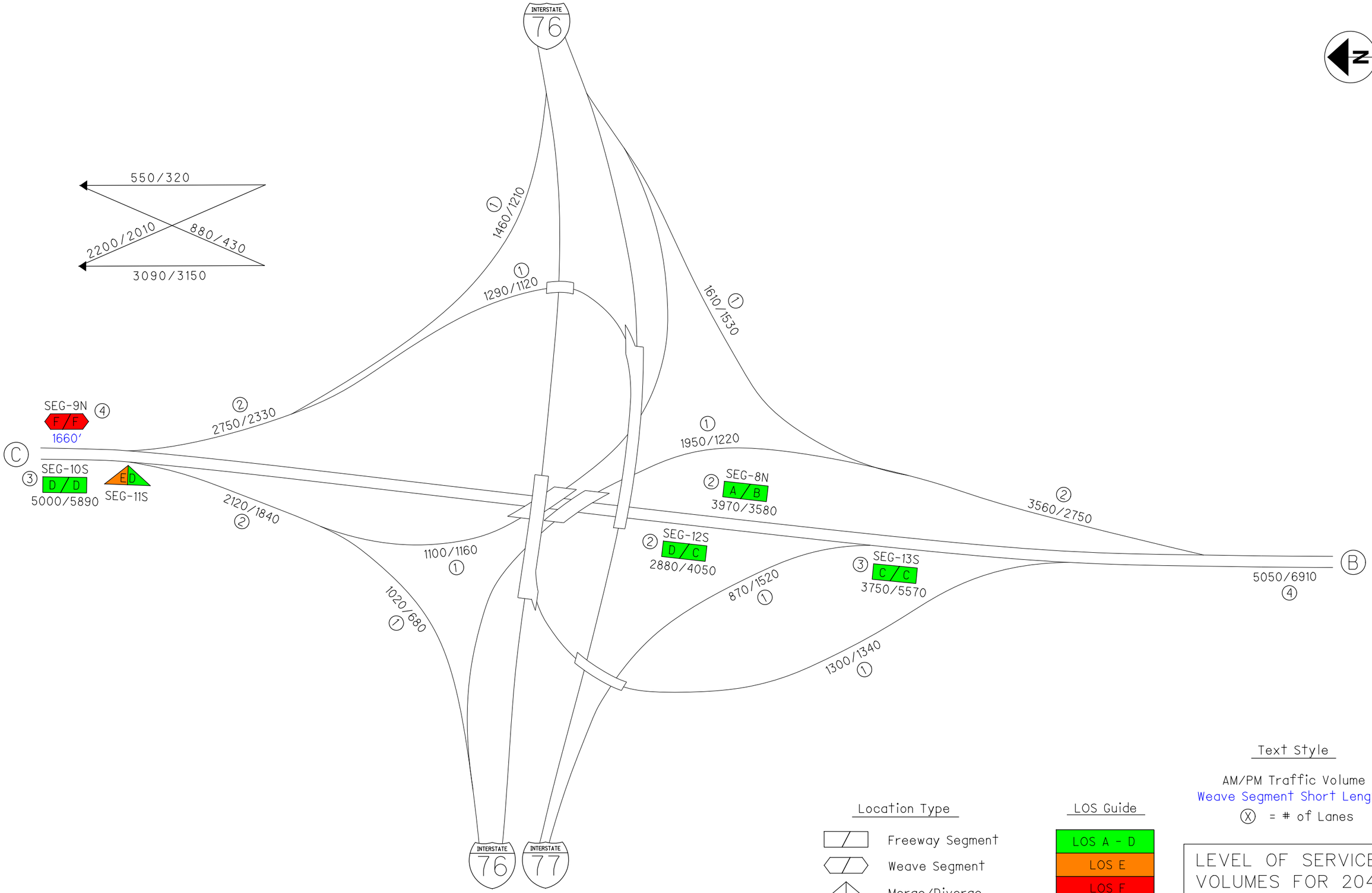
Location Type

- Freeway Segment
- Weave Segment
- Merge/Diverge

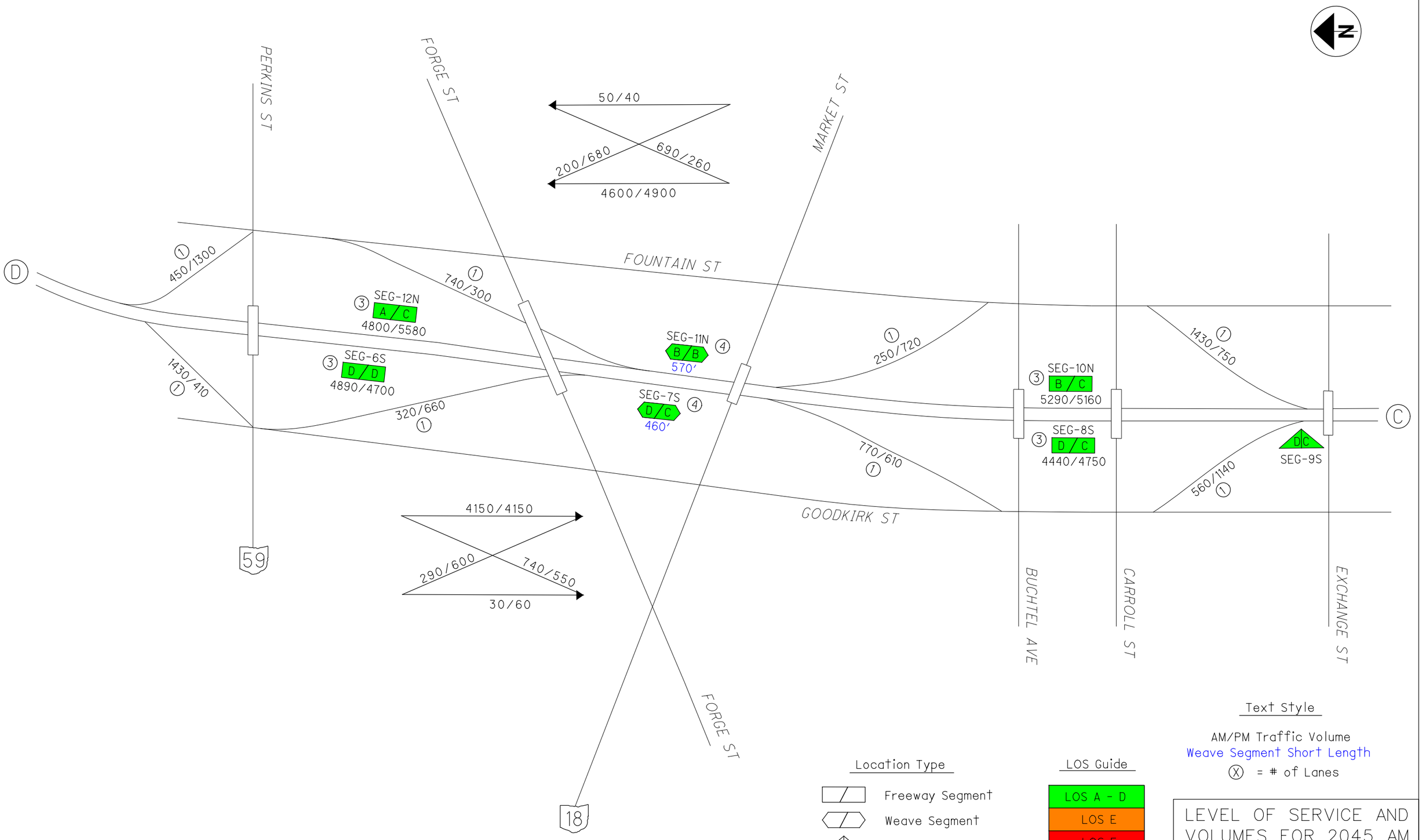
LOS Guide

- LOS A - D
- LOS E
- LOS F

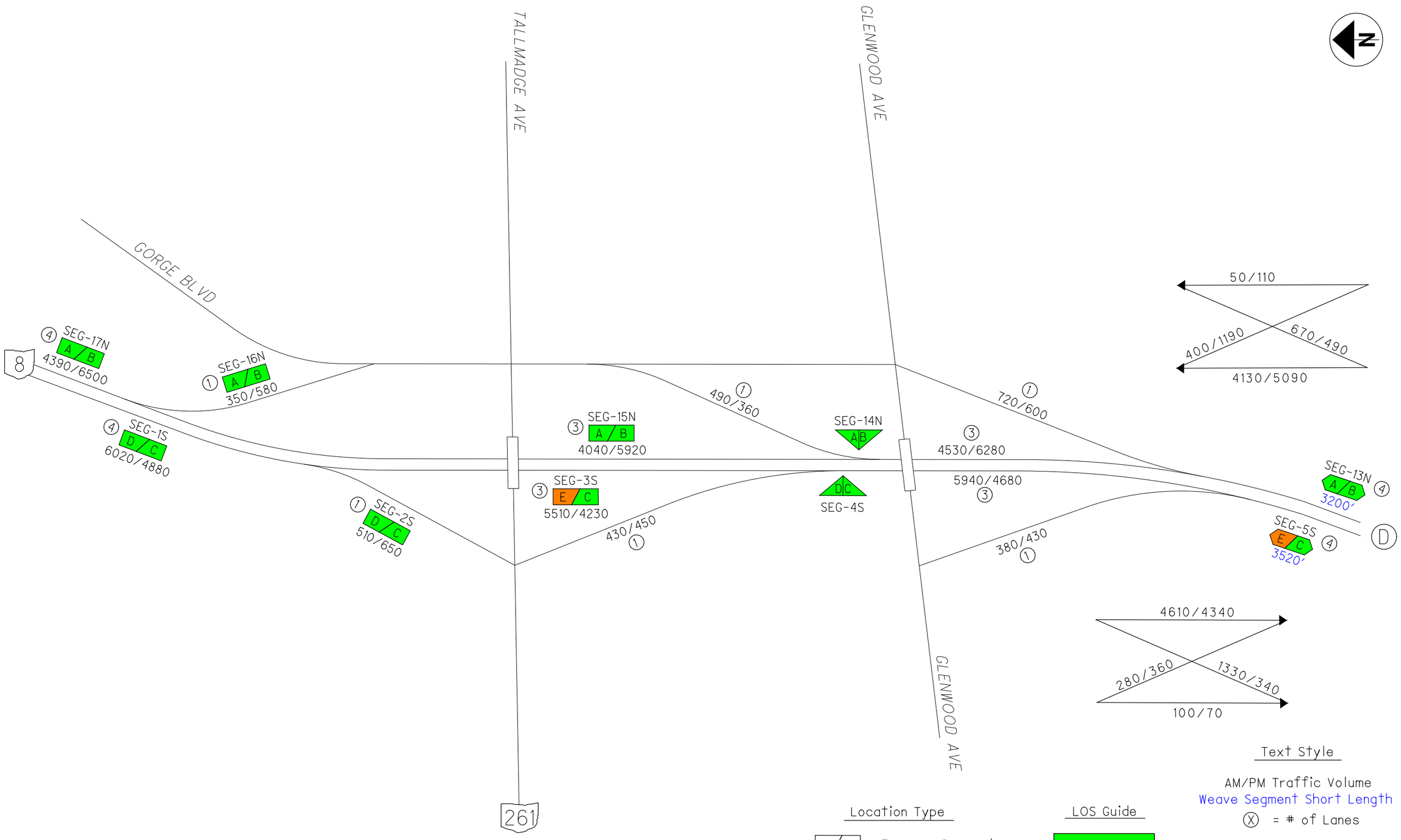
LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM NO-BUILD



LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM NO-BUILD



LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM NO-BUILD



LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM NO-BUILD

I-77 Northbound

AM No-Build

HCS Facilities and Segment Output

HCS7 Freeway Facilities Report

Project Information

Analyst	MEL	Date	5/18/2020
Agency	Burgess & Niple	Analysis Year	2045 No-Build
Jurisdiction		Time Period Analyzed	AM Peak Northbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary

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	17
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	6.36		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	South of WB I-277 On-ramp	2000	3
2	Merge	Merge	WB I-277 On-ramp	1080	3
3	Weaving	Weaving	Waterloo On to Wilbreth Off	2090	4
4	Basic	Basic	South of Wilbreth On	1880	3
5	Merge	Merge	Wilbreth On-ramp	1500	3
6	Basic	Basic	South of Archwood On-Ramp	810	3
7	Weaving	Weaving	Archwood On to I-76 Off	3250	4
8	Basic	Basic	South of I-76 On-Ramp	2340	2
9	Weaving	Weaving	I-76 On to Carroll Off	3370	4
10	Basic	Basic	South of Butchel On-Ramp	1640	3
11	Weaving	Weaving	Butchel On to Perkins Off	1570	4
12	Basic	Basic	South of Perkins On-Ramp	1350	3
13	Weaving	Weaving	Perkins On to Glenwood Off	4200	4
14	Diverge	Diverge	Tallmadge Off-Ramp	1010	3
15	Basic	Basic	South of Tallmadge On-Ramp	2010	3
16	Merge	Basic	Tallmadge On-Ramp	1500	4
17	Basic	Basic	North of Tallmadge On-Ramp	2000	4

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	4740	6900	0.85	17.5	90.4	F

Segment 2: Merge

Time Period	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	Freeway	Ramp	

1	0.94	0.94	0.971	0.962	4937	840	6900	2100	0.97	0.40	21.3	50.1	77.3	34.1	F

Segment 3: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	4686	8468	0.84	12.8	91.8	F

Segment 4: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	4109	6900	0.99	13.9	98.7	F

Segment 5: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.962	4267	575	6900	2100	1.07	0.27	14.5	47.5	98.4	38.2	F

Segment 6: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	4161	6900	1.06	13.6	101.8	F

Segment 7: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	4433	4761	1.75	54.1	20.5	F

Segment 8: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	569	4600	0.94	59.9	4.7	A

Segment 9: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	3554	5195	1.42	53.5	16.6	F

Segment 10: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	2002	6900	0.84	59.9	11.1	B

Segment 11: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	2265	8113	0.75	53.1	10.7	B

Segment 12: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	1454	6900	0.76	59.4	8.1	A

Segment 13: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	1947	8768	0.66	52.9	9.2	A

Segment 14: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.980	1158	532	6900	2100	0.73	0.25	55.4	53.8	7.0	7.2	A

Segment 15: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	626	6900	0.65	59.6	3.5	A

Segment 16: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.952	1017	391	9200	2100	0.53	0.19	56.1	56.1	4.5	4.5	A

Segment 17: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	1017	9200	0.53	59.8	4.2	A

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	24.8	32.1	31.1	15.40	F

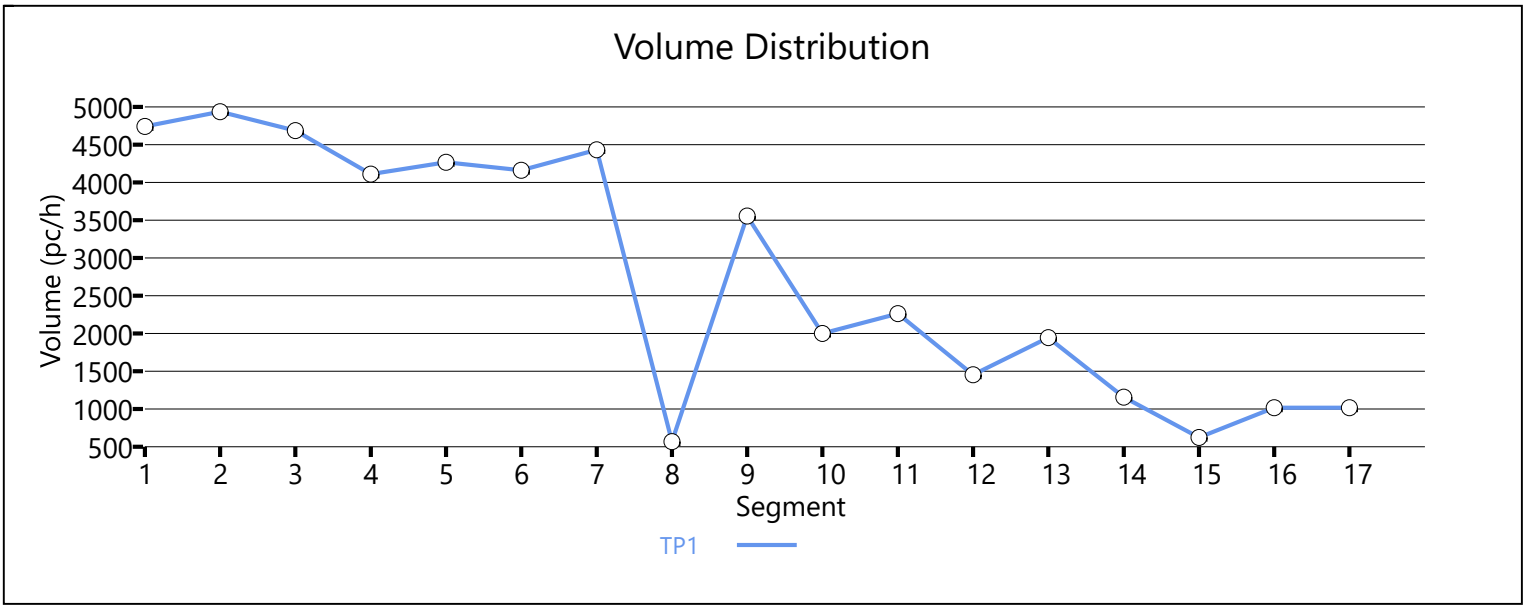
Facility Overall Results

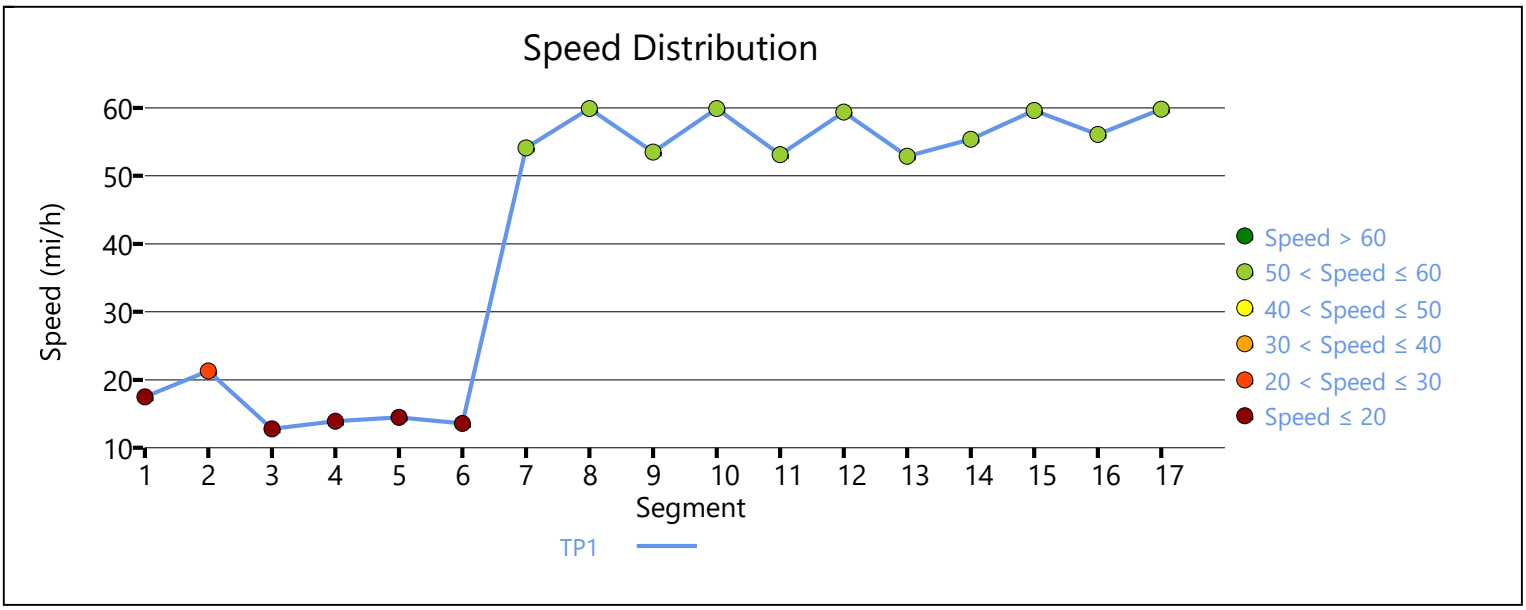
Space Mean Speed, mi/h	24.8	Density, veh/mi/ln	31.1
Average Travel Time, min	15.40	Density, pc/mi/ln	32.1

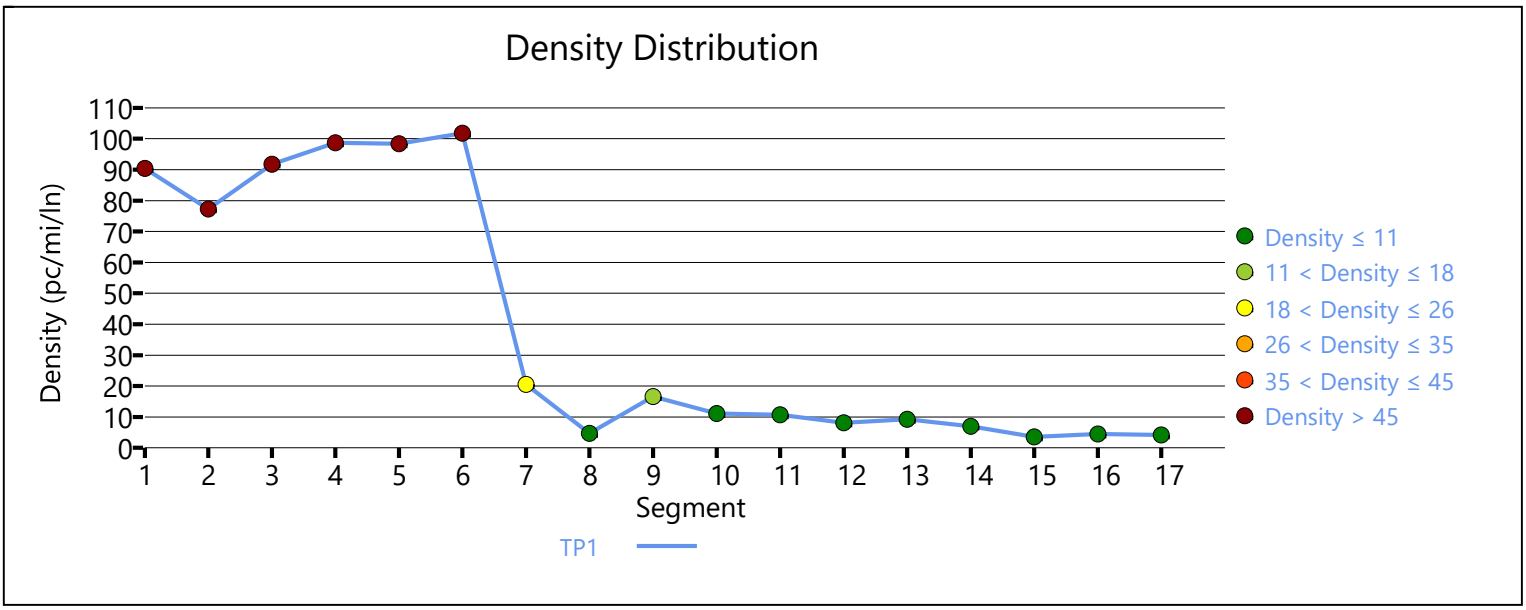
Messages

WARNING 1	Oversaturated conditions currently exist in boundary time period 1. Results may not be reliable. Consider expanding analysis in time and/or space to resolve this warning.
WARNING 2	Queue extends past the beginning of the facility on time period 1. Consider expanding the length of the facility to account for these vehicles performance and affect on upstream segments.

Comments







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HCS7 Basic Freeway Report

Project Information

Analyst	MEL	Date	5/18/2020
Agency	Burgess & Niple	Analysis Year	2045 No-Build
Jurisdiction		Time Period Analyzed	AM Peak Northbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary
Segment Number	1	Segment Name	South of WB I-277 On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5340	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1950
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.69
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	17.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	90.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	2	Segment Name	WB I-277 On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1080	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5340	760
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	5851	840
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.72	0.40

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.551
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2340
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	50.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	53.2
Flow in Lanes 1 and 2 (v12), pc/h	3511	Ramp Junction Speed (S), mi/h	21.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	4351	Average Density (D), pc/mi/ln	77.3
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	34.1

HCS7 Freeway Weaving Report

Project Information

Segment Number	3	Segment Name	Waterloo On to Wilbreth Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1090	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.67	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5860	370	30	240
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	4.00	4.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.962	0.962	0.971
Flow Rate (v_i), pc/h	6420	409	33	263
Weaving Flow Rate (v_W), pc/h	672	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	6453	Density-Based Capacity (c_{IWL}), pc/h/ln		2117
Total Flow Rate (v), pc/h	7125	Demand Flow-Based Capacity (c_{IW}), pc/h		25532
Volume Ratio (VR)	0.094	Weaving Segment Capacity (c_W), veh/h		8218
Minimum Lane Change Rate (LC_{MIN}), lc/h	672	Adjusted Weaving Area Capacity, pc/h		8468
Maximum Weaving Length (L_{MAX}), ft	3481	Volume-to-Capacity Ratio (v/c)		0.55

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1172	Average Weaving Speed (S_W), mi/h	47.3
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1150	Average Non-Weaving Speed (S_{NW}), mi/h	46.6
Weaving Lane Change Rate (LC_W), lc/h	1056	Average Speed (S), mi/h	12.8
Weaving Lane Change Rate (LC_{All}), lc/h	2206	Density (D), pc/mi/ln	91.8
Weaving Intensity Factor (W)	0.394	Level of Service (LOS)	F

HCS7 Basic Freeway Report

Project Information			
Segment Number	4	Segment Name	South of Wilbreth On
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1880	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6230	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2275
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.60
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	13.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	98.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	5	Segment Name	Wilbreth On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	6230	520
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.962
Flow Rate (v_i),pc/h	6826	575
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.62	0.27

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	1801.6	Number of Outer Lanes on Freeway (N_O)	1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.696
Downstream Equilibrium Distance (L_{EQ}), ft	0.0	Flow Outer Lanes (v_{OA}), pc/h/ln	2700
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	47.5
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	0.594	Outer Lanes Freeway Speed (S_O), mi/h	51.1
Flow in Lanes 1 and 2 (v_{12}), pc/h	4126	Ramp Junction Speed (S), mi/h	14.5
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	4701	Average Density (D), pc/mi/ln	98.4
Level of Service (LOS)	F	Density in Ramp Influence Area (D_R), pc/mi/ln	38.2

HCS7 Basic Freeway Report

Project Information			
Segment Number	6	Segment Name	South of Archwood On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	810	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6750	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2442
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.60
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	13.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	101.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	7	Segment Name	Archwood On to I-76 Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	2250	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	2
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3500	470	310	3250
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	3.00	3.00	7.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.971	0.971	0.935
Flow Rate (v_i), pc/h	2109	0	272	2052
Weaving Flow Rate (v_W), pc/h	2052	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	2381	Density-Based Capacity (c_{IWL}), pc/h/ln		1870
Total Flow Rate (v), pc/h	4433	Demand Flow-Based Capacity (c_{IW}), pc/h		4762
Volume Ratio (VR)	0.504	Weaving Segment Capacity (c_W), veh/h		4567
Minimum Lane Change Rate (LC_{MIN}), lc/h	0	Adjusted Weaving Area Capacity, pc/h		4761
Maximum Weaving Length (L_{MAX}), ft	7873	Volume-to-Capacity Ratio (v/c)		0.93

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1071	Average Weaving Speed (S_W), mi/h	53.4
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	939	Average Non-Weaving Speed (S_{NW}), mi/h	54.7
Weaving Lane Change Rate (LC_W), lc/h	664	Average Speed (S), mi/h	54.1
Weaving Lane Change Rate (LC_{All}), lc/h	1603	Density (D), pc/mi/ln	20.5
Weaving Intensity Factor (W)	0.173	Level of Service (LOS)	F

HCS7 Basic Freeway Report

Project Information			
Segment Number	8	Segment Name	South of I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	2340	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3970	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	285
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.12
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	4.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	9	Segment Name	I-76 On to Carroll Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1660	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3090	2200	550	880
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	4.00	4.00	4.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.962	0.962	0.962
Flow Rate (v_i), pc/h	441	2377	608	128
Weaving Flow Rate (v_W), pc/h	2505	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	1049	Density-Based Capacity (c_{IWL}), pc/h/ln		1862
Total Flow Rate (v), pc/h	3554	Demand Flow-Based Capacity (c_{IW}), pc/h		5195
Volume Ratio (VR)	0.462	Weaving Segment Capacity (c_W), veh/h		5040
Minimum Lane Change Rate (LC_{MIN}), lc/h	256	Adjusted Weaving Area Capacity, pc/h		5195
Maximum Weaving Length (L_{MAX}), ft	7386	Volume-to-Capacity Ratio (v/c)		0.68

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	406	Average Weaving Speed (S_W), mi/h	53.3
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	345	Average Non-Weaving Speed (S_{NW}), mi/h	53.9
Weaving Lane Change Rate (LC_W), lc/h	859	Average Speed (S), mi/h	53.5
Weaving Lane Change Rate (LC_{All}), lc/h	1204	Density (D), pc/mi/ln	16.6
Weaving Intensity Factor (W)	0.175	Level of Service (LOS)	F

HCS7 Basic Freeway Report

Project Information			
Segment Number	10	Segment Name	South of Butchel On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1640	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5290	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	667
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.29
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	11.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	11	Segment Name	Butchel On to Perkins Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	570	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4600	200	50	690
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	5.00	5.00	1.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.952	0.952	0.990
Flow Rate (v_i), pc/h	1745	207	56	257
Weaving Flow Rate (v_W), pc/h	464	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	1801	Density-Based Capacity (c_{IWL}), pc/h/ln		2028
Total Flow Rate (v), pc/h	2265	Demand Flow-Based Capacity (c_{IW}), pc/h		15094
Volume Ratio (VR)	0.159	Weaving Segment Capacity (c_W), veh/h		7889
Minimum Lane Change Rate (LC_{MIN}), lc/h	464	Adjusted Weaving Area Capacity, pc/h		8113
Maximum Weaving Length (L_{MAX}), ft	4121	Volume-to-Capacity Ratio (v/c)		0.28

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	222	Average Weaving Speed (S_W), mi/h	50.4
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	0	Average Non-Weaving Speed (S_{NW}), mi/h	53.9
Weaving Lane Change Rate (LC_W), lc/h	722	Average Speed (S), mi/h	53.1
Weaving Lane Change Rate (LC_{All}), lc/h	722	Density (D), pc/mi/ln	10.7
Weaving Intensity Factor (W)	0.272	Level of Service (LOS)	B

HCS7 Basic Freeway Report

Project Information			
Segment Number	12	Segment Name	South of Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1350	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4800	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	485
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.21
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.4
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	8.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	13	Segment Name	Perkins On to Glenwood Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	3200	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.67	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4130	400	50	670
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	3.00	3.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.971	0.971	0.943
Flow Rate (v_i), pc/h	1246	438	55	208
Weaving Flow Rate (v_W), pc/h	646	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	1301	Density-Based Capacity (c_{IWL}), pc/h/ln		2192
Total Flow Rate (v), pc/h	1947	Demand Flow-Based Capacity (c_{IW}), pc/h		11594
Volume Ratio (VR)	0.207	Weaving Segment Capacity (c_W), veh/h		8482
Minimum Lane Change Rate (LC_{MIN}), lc/h	646	Adjusted Weaving Area Capacity, pc/h		8768
Maximum Weaving Length (L_{MAX}), ft	4608	Volume-to-Capacity Ratio (v/c)		0.22

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	694	Average Weaving Speed (S_W), mi/h	52.7
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1232	Average Non-Weaving Speed (S_{NW}), mi/h	53.0
Weaving Lane Change Rate (LC_W), lc/h	1382	Average Speed (S), mi/h	52.9
Weaving Lane Change Rate (LC_{All}), lc/h	2614	Density (D), pc/mi/ln	9.2
Weaving Intensity Factor (W)	0.193	Level of Service (LOS)	A

HCS7 Freeway Diverge Report

Project Information

Segment Number	14	Segment Name	Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1010	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4530	490
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.980
Flow Rate (vi),pc/h	5010	532
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.17	0.25

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.346
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	183
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	53.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.707	Outer Lanes Freeway Speed (SO), mi/h	65.8
Flow in Lanes 1 and 2 (v12), pc/h	975	Ramp Junction Speed (S), mi/h	55.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	7.0
Level of Service (LOS)	A	Density in Ramp Influence Area (DR), pc/mi/ln	7.2

HCS7 Basic Freeway Report

Project Information			
Segment Number	15	Segment Name	South of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2010	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4040	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	209
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.09
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	3.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	16	Segment Name	Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	0
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4040	350
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.952
Flow Rate (vi),pc/h	4468	391
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.11	0.19

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.328
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	188
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	56.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.000	Outer Lanes Freeway Speed (SO), mi/h	60.0
Flow in Lanes 1 and 2 (v12), pc/h	250	Ramp Junction Speed (S), mi/h	56.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	641	Average Density (D), pc/mi/ln	4.5
Level of Service (LOS)	A	Density in Ramp Influence Area (DR), pc/mi/ln	4.5

HCS7 Basic Freeway Report

Project Information

Segment Number	17	Segment Name	North of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4390	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	254
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.11
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	4.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

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I-77 Northbound

PM No-Build

HCS Facilities and Segment Output

HCS7 Freeway Facilities Report

Project Information

Analyst	MEL	Date	5/18/2020
Agency	Burgess & Niple	Analysis Year	2045 No-Build
Jurisdiction		Time Period Analyzed	PM Peak Northbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary

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	17
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	6.36		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	South of WB I-277 On-ramp	2000	3
2	Merge	Merge	WB I-277 On-ramp	1080	3
3	Weaving	Weaving	Waterloo On to Wilbreth Off	2090	4
4	Basic	Basic	South of Wilbreth On	1880	3
5	Merge	Merge	Wilbreth On-ramp	1500	3
6	Basic	Basic	South of Archwood On-Ramp	810	3
7	Weaving	Weaving	Archwood On to I-76 Off	3250	4
8	Basic	Basic	South of I-76 On-Ramp	2340	2
9	Weaving	Weaving	I-76 On to Carroll Off	3370	4
10	Basic	Basic	South of Butchel On-Ramp	1640	3
11	Weaving	Weaving	Butchel On to Perkins Off	1570	4
12	Basic	Basic	South of Perkins On-Ramp	1350	3
13	Weaving	Weaving	Perkins On to Glenwood Off	4200	4
14	Diverge	Diverge	Tallmadge Off-Ramp	1010	3
15	Basic	Basic	South of Tallmadge On-Ramp	2010	3
16	Merge	Basic	Tallmadge On-Ramp	1500	4
17	Basic	Basic	North of Tallmadge On-Ramp	2000	4

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	5247	6900	0.76	59.6	29.3	D

Segment 2: Merge

Time Period	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	Freeway	Ramp	

1	0.94	0.94	0.980	0.952	5448	492	6900	2100	0.83	0.23	53.8	53.3	33.8	27.3	C

Segment 3: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	5237	8340	0.75	22.2	59.0	F

Segment 4: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	4477	6900	0.84	19.1	78.2	F

Segment 5: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.980	4644	499	6900	2100	0.91	0.24	17.9	51.6	86.6	32.3	F

Segment 6: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	4539	6900	0.91	16.3	93.0	F

Segment 7: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	4807	5162	1.35	53.1	22.6	F

Segment 8: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	1822	4600	0.84	59.9	15.2	B

Segment 9: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	4208	5811	1.10	51.9	20.3	F

Segment 10: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	3394	6900	0.81	59.9	18.9	C

Segment 11: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	3666	8112	0.79	52.3	17.5	B

Segment 12: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	3340	6900	0.88	59.3	18.6	C

Segment 13: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	3622	8656	0.86	52.2	17.3	B

Segment 14: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.980	2970	391	6900	2100	0.99	0.19	56.9	54.0	17.4	17.0	B

Segment 15: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	2579	6900	0.93	59.7	14.3	B

Segment 16: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.952	2848	648	9200	2100	0.77	0.31	56.3	56.3	12.6	12.6	B

Segment 17: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	2848	9200	0.77	59.8	11.9	B

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	38.6	28.8	28.2	9.90	F

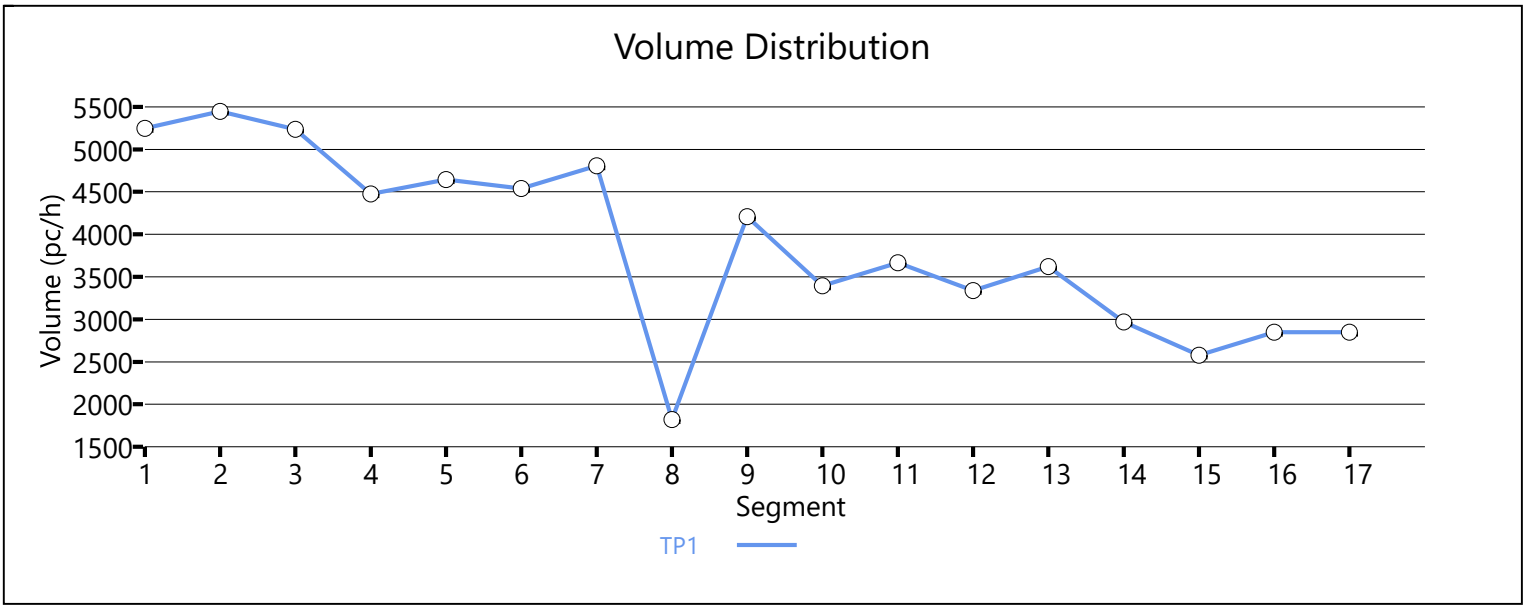
Facility Overall Results

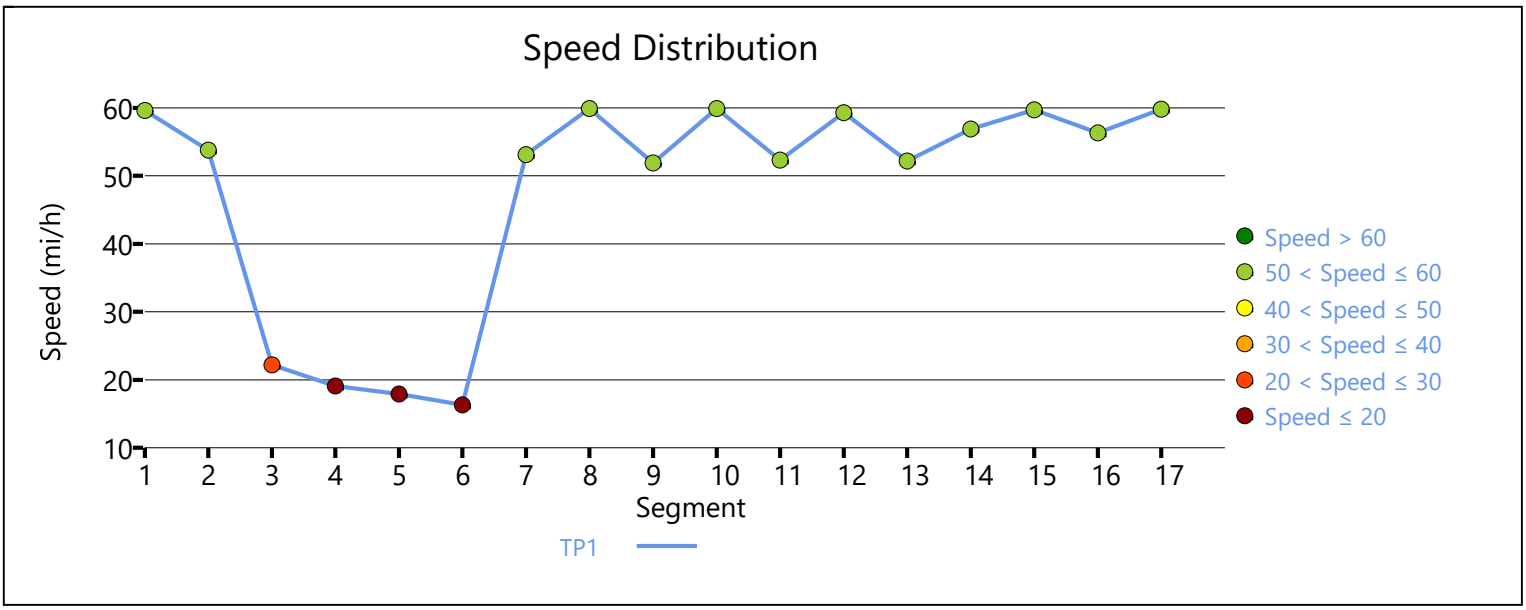
Space Mean Speed, mi/h	38.6	Density, veh/mi/ln	28.2
Average Travel Time, min	9.90	Density, pc/mi/ln	28.8

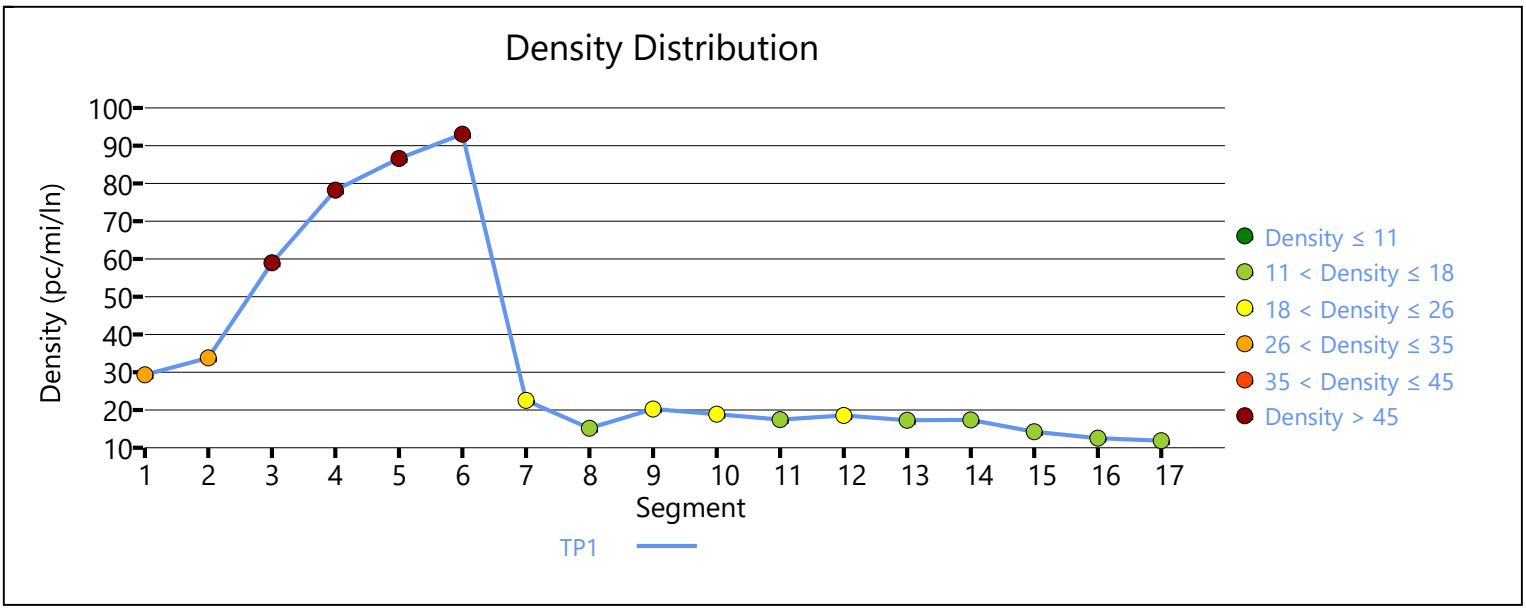
Messages

WARNING 1	Oversaturated conditions currently exist in boundary time period 1. Results may not be reliable. Consider expanding analysis in time and/or space to resolve this warning.

Comments







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HCS7 Basic Freeway Report

Project Information

Analyst	MEL	Date	5/18/2020
Agency	Burgess & Niple	Analysis Year	2045 No-Build
Jurisdiction		Time Period Analyzed	PM Peak Northbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary
Segment Number	1	Segment Name	South of WB I-277 On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4840	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1749
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.76
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	2	Segment Name	WB I-277 On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1080	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4840	440
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.952
Flow Rate (vi),pc/h	5254	492
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.79	0.23

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.374
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1982
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	53.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	54.7
Flow in Lanes 1 and 2 (v12), pc/h	2974	Ramp Junction Speed (S), mi/h	53.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	3466	Average Density (D), pc/mi/ln	33.8
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	27.3

HCS7 Freeway Weaving Report

Project Information

Segment Number	3	Segment Name	Waterloo On to Wilbreth Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1090	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.67	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4910	420	60	370
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.980	0.980	0.980
Flow Rate (v_i), pc/h	5330	456	65	402
Weaving Flow Rate (v_W), pc/h	858	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	5395	Density-Based Capacity (c_{IWL}), pc/h/ln		2085
Total Flow Rate (v), pc/h	6253	Demand Flow-Based Capacity (c_{IW}), pc/h		17518
Volume Ratio (VR)	0.137	Weaving Segment Capacity (c_W), veh/h		8173
Minimum Lane Change Rate (LC_{MIN}), lc/h	858	Adjusted Weaving Area Capacity, pc/h		8340
Maximum Weaving Length (L_{MAX}), ft	3902	Volume-to-Capacity Ratio (v/c)		0.63

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	980	Average Weaving Speed (S_W), mi/h	47.4
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	932	Average Non-Weaving Speed (S_{NW}), mi/h	46.3
Weaving Lane Change Rate (LC_W), lc/h	1242	Average Speed (S), mi/h	22.2
Weaving Lane Change Rate (LC_{All}), lc/h	2174	Density (D), pc/mi/ln	59.0
Weaving Intensity Factor (W)	0.390	Level of Service (LOS)	F

HCS7 Basic Freeway Report

Project Information			
Segment Number	4	Segment Name	South of Wilbreth On
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1880	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5330	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1929
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.65
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	19.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	78.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	5	Segment Name	Wilbreth On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5330	460
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.980
Flow Rate (vi),pc/h	5786	499
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.67	0.24

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.467
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2349
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	51.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.594	Outer Lanes Freeway Speed (SO), mi/h	53.2
Flow in Lanes 1 and 2 (v12), pc/h	3437	Ramp Junction Speed (S), mi/h	17.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	3936	Average Density (D), pc/mi/ln	86.6
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	32.3

HCS7 Basic Freeway Report

Project Information			
Segment Number	6	Segment Name	South of Archwood On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	810	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5790	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2095
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.66
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	16.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	93.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	7	Segment Name	Archwood On to I-76 Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1400	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	2
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3240	340	200	2550
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	1.00	1.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.990	0.990	0.943
Flow Rate (v_i), pc/h	2497	53	215	2042
Weaving Flow Rate (v_W), pc/h	2095	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	2712	Density-Based Capacity (c_{IWL}), pc/h/ln		1839
Total Flow Rate (v), pc/h	4807	Demand Flow-Based Capacity (c_{IW}), pc/h		5161
Volume Ratio (VR)	0.465	Weaving Segment Capacity (c_W), veh/h		4984
Minimum Lane Change Rate (LC_{MIN}), lc/h	106	Adjusted Weaving Area Capacity, pc/h		5162
Maximum Weaving Length (L_{MAX}), ft	7420	Volume-to-Capacity Ratio (v/c)		0.93

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	759	Average Weaving Speed (S_W), mi/h	52.7
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	547	Average Non-Weaving Speed (S_{NW}), mi/h	53.5
Weaving Lane Change Rate (LC_W), lc/h	604	Average Speed (S), mi/h	53.1
Weaving Lane Change Rate (LC_{All}), lc/h	1151	Density (D), pc/mi/ln	22.6
Weaving Intensity Factor (W)	0.194	Level of Service (LOS)	F

HCS7 Basic Freeway Report

Project Information			
Segment Number	8	Segment Name	South of I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	2340	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3580	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	911
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.40
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	15.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	9	Segment Name	I-76 On to Carroll Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1660	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3150	2010	320	430
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.980	0.980	0.980
Flow Rate (v_i), pc/h	1602	2040	347	219
Weaving Flow Rate (v_W), pc/h	2259	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	1949	Density-Based Capacity (c_{IWL}), pc/h/ln		1905
Total Flow Rate (v), pc/h	4208	Demand Flow-Based Capacity (c_{IW}), pc/h		5811
Volume Ratio (VR)	0.413	Weaving Segment Capacity (c_W), veh/h		5695
Minimum Lane Change Rate (LC_{MIN}), lc/h	438	Adjusted Weaving Area Capacity, pc/h		5811
Maximum Weaving Length (L_{MAX}), ft	6827	Volume-to-Capacity Ratio (v/c)		0.72

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	755	Average Weaving Speed (S_W), mi/h	52.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	531	Average Non-Weaving Speed (S_{NW}), mi/h	51.8
Weaving Lane Change Rate (LC_W), lc/h	1041	Average Speed (S), mi/h	51.9
Weaving Lane Change Rate (LC_{All}), lc/h	1572	Density (D), pc/mi/ln	20.3
Weaving Intensity Factor (W)	0.216	Level of Service (LOS)	F

HCS7 Basic Freeway Report

Project Information			
Segment Number	10	Segment Name	South of Butchel On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1640	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5160	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1131
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.49
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	18.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	11	Segment Name	Butchel On to Perkins Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	570	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4900	680	40	260
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	1.00	1.00	1.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.990	0.990	0.990
Flow Rate (v_i), pc/h	3226	228	43	169
Weaving Flow Rate (v_W), pc/h	397	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	3269	Density-Based Capacity (c_{IWL}), pc/h/ln		2028
Total Flow Rate (v), pc/h	3666	Demand Flow-Based Capacity (c_{IW}), pc/h		15094
Volume Ratio (VR)	0.159	Weaving Segment Capacity (c_W), veh/h		7963
Minimum Lane Change Rate (LC_{MIN}), lc/h	397	Adjusted Weaving Area Capacity, pc/h		8112
Maximum Weaving Length (L_{MAX}), ft	4121	Volume-to-Capacity Ratio (v/c)		0.45

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	404	Average Weaving Speed (S_W), mi/h	49.2
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	212	Average Non-Weaving Speed (S_{NW}), mi/h	52.7
Weaving Lane Change Rate (LC_W), lc/h	655	Average Speed (S), mi/h	52.3
Weaving Lane Change Rate (LC_{All}), lc/h	867	Density (D), pc/mi/ln	17.5
Weaving Intensity Factor (W)	0.315	Level of Service (LOS)	B

HCS7 Basic Freeway Report

Project Information			
Segment Number	12	Segment Name	South of Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1350	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5580	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1113
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.48
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	18.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	13	Segment Name	Perkins On to Glenwood Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	3200	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.67	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5090	1190	110	490
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	1.00	1.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.990	0.990	0.971
Flow Rate (v_i), pc/h	3044	164	118	296
Weaving Flow Rate (v_W), pc/h	460	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	3162	Density-Based Capacity (c_{IWL}), pc/h/ln		2164
Total Flow Rate (v), pc/h	3622	Demand Flow-Based Capacity (c_{IW}), pc/h		9877
Volume Ratio (VR)	0.243	Weaving Segment Capacity (c_W), veh/h		8493
Minimum Lane Change Rate (LC_{MIN}), lc/h	460	Adjusted Weaving Area Capacity, pc/h		8656
Maximum Weaving Length (L_{MAX}), ft	4981	Volume-to-Capacity Ratio (v/c)		0.42

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1686	Average Weaving Speed (S_W), mi/h	51.6
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2078	Average Non-Weaving Speed (S_{NW}), mi/h	52.3
Weaving Lane Change Rate (LC_W), lc/h	1196	Average Speed (S), mi/h	52.2
Weaving Lane Change Rate (LC_{All}), lc/h	3274	Density (D), pc/mi/ln	17.3
Weaving Intensity Factor (W)	0.230	Level of Service (LOS)	B

HCS7 Freeway Diverge Report

Project Information

Segment Number	14	Segment Name	Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1010	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6280	360
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.980
Flow Rate (vi),pc/h	6817	391
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.43	0.19

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.333
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	856
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.668	Outer Lanes Freeway Speed (SO), mi/h	65.8
Flow in Lanes 1 and 2 (v12), pc/h	2114	Ramp Junction Speed (S), mi/h	56.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	17.4
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.0

HCS7 Basic Freeway Report

Project Information			
Segment Number	15	Segment Name	South of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2010	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5920	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	860
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.37
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	14.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	16	Segment Name	Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	0
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5920	580
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.952
Flow Rate (vi),pc/h	6426	648
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.31	0.31

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.339
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	660
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	56.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.000	Outer Lanes Freeway Speed (SO), mi/h	59.4
Flow in Lanes 1 and 2 (v12), pc/h	880	Ramp Junction Speed (S), mi/h	56.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	1528	Average Density (D), pc/mi/ln	12.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	12.6

HCS7 Basic Freeway Report

Project Information

Segment Number	17	Segment Name	North of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6500	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	712
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.31
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	11.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

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I-77 Southbound

AM No-Build

HCS Facilities and Segment Output

HCS7 Freeway Facilities Report

Project Information

Analyst	MEL	Date	5/14/2020
Agency	Burgess & Niple	Analysis Year	2045 No-Build
Jurisdiction		Time Period Analyzed	AM Peak Southbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary

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	20
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	6.33		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	North of Tallmadge Off-Ramp	2000	4
2	Diverge	Basic	Tallmadge Off-Ramp	1500	4
3	Basic	Basic	North of Tallmadge On-Ramp	1620	3
4	Merge	Merge	Tallmadge On-Ramp	1090	3
5	Weaving	Weaving	Glenwood On to Perkins Off	4680	4
6	Basic	Basic	North of Perkins On-Ramp	1300	3
7	Weaving	Weaving	Perkins On to Butchel Off	1460	4
8	Basic	Basic	North of Carroll On-Ramp	2180	3
9	Merge	Merge	Caroll On-Ramp	1280	3
10	Overlap	Overlap	Carroll On to I-76 Off	220	3
11	Diverge	Diverge	I-76 Off-Ramp	1280	3
12	Basic	Basic	North of EB I-76 On-Ramp	2500	2
13	Merge	Basic	EB I-76 On-Ramp	130	3
14	Weaving	Weaving	I-76 On to Archwood Off	3180	4
15	Basic	Basic	North of Wilbreth Off-Ramp	690	3
16	Diverge	Diverge	Wilbreth Off-Ramp	1500	3
17	Basic	Basic	North of Wilbreth On-ramp	1530	3
18	Weaving	Weaving	Wilbreth on to Waterloo off	2740	4
19	Diverge	Diverge	277 WB Off-Ramp	540	3
20	Basic	Basic	South of 277 WB Off-Ramp	2000	3

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	6657	9200	0.72	59.9	27.8	D

Segment 2: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.943	6657	575	9200	2100	0.72	0.27	59.9	59.9	27.8	27.8	D

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	6093	6900	0.88	56.6	35.9	E

Segment 4: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.917	6592	499	6900	2100	0.96	0.24	51.6	51.0	42.6	32.9	D

Segment 5: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	6987	8716	0.80	41.1	42.5	E

Segment 6: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	5464	6900	0.79	59.1	30.8	D

Segment 7: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	5796	7972	0.73	44.3	32.7	D

Segment 8: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	4962	6900	0.72	59.2	27.6	D

Segment 9: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.952	0.971	5576	614	6900	2100	0.81	0.29	53.5	52.9	34.7	28.8	D

Segment 10: Overlap

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	5587	6900	0.81	53.5	34.7	D

Segment 11: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.952	0.971	5587	2323	6900	4200	0.81	0.55	54.2	50.9	34.4	36.9	E

Segment 12: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	3218	4600	0.70	59.7	26.8	D

Segment 13: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.952	0.935	4208	990	6900	2100	0.61	0.47	60.0	60.0	23.4	23.4	C

Segment 14: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	5663	7668	0.74	40.1	35.3	E

Segment 15: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.935	5279	6900	0.77	59.1	29.6	D

Segment 16: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.935	0.962	5279	343	6900	2100	0.77	0.16	56.8	54.1	31.0	28.3	D

Segment 17: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.935	4927	6900	0.71	59.7	27.4	D

Segment 18: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.935	5375	8560	0.63	48.7	27.6	C

Segment 19: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.935	0.935	5018	922	6900	2100	0.73	0.44	56.1	53.1	29.8	28.5	D

Segment 20: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.935	4096	6900	0.59	59.5	22.8	C

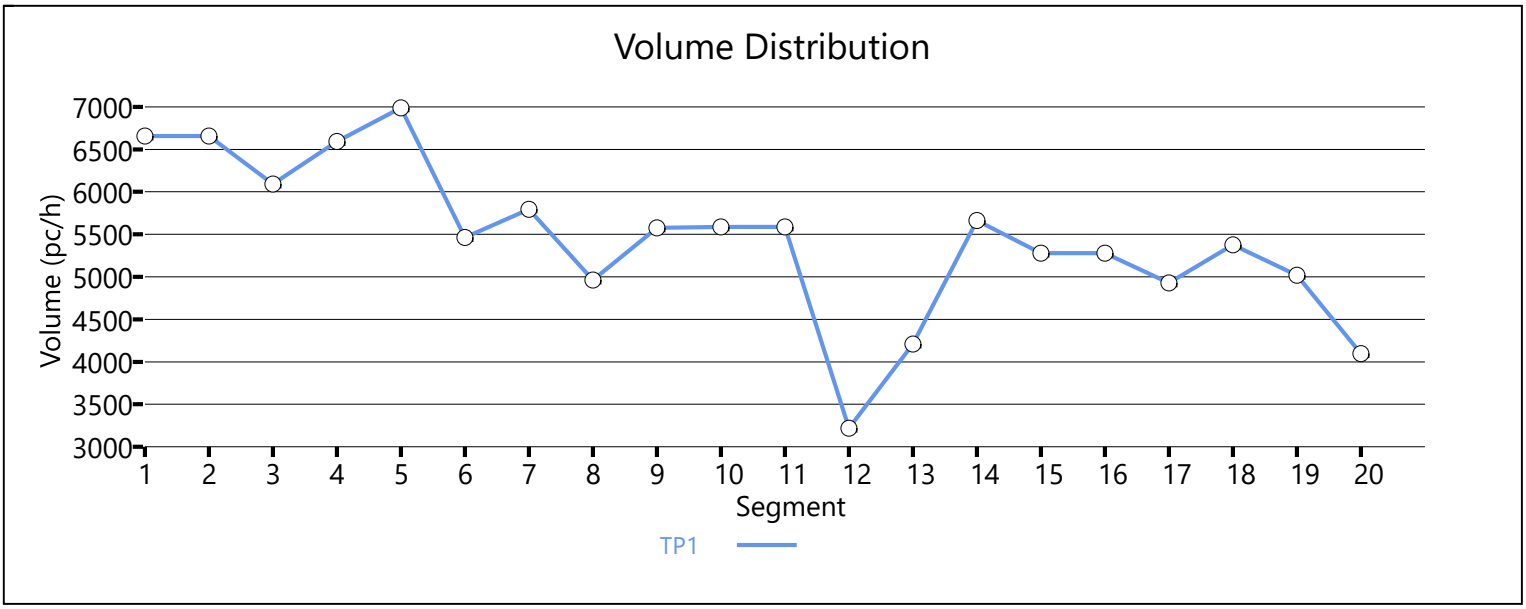
Facility Time Period Results

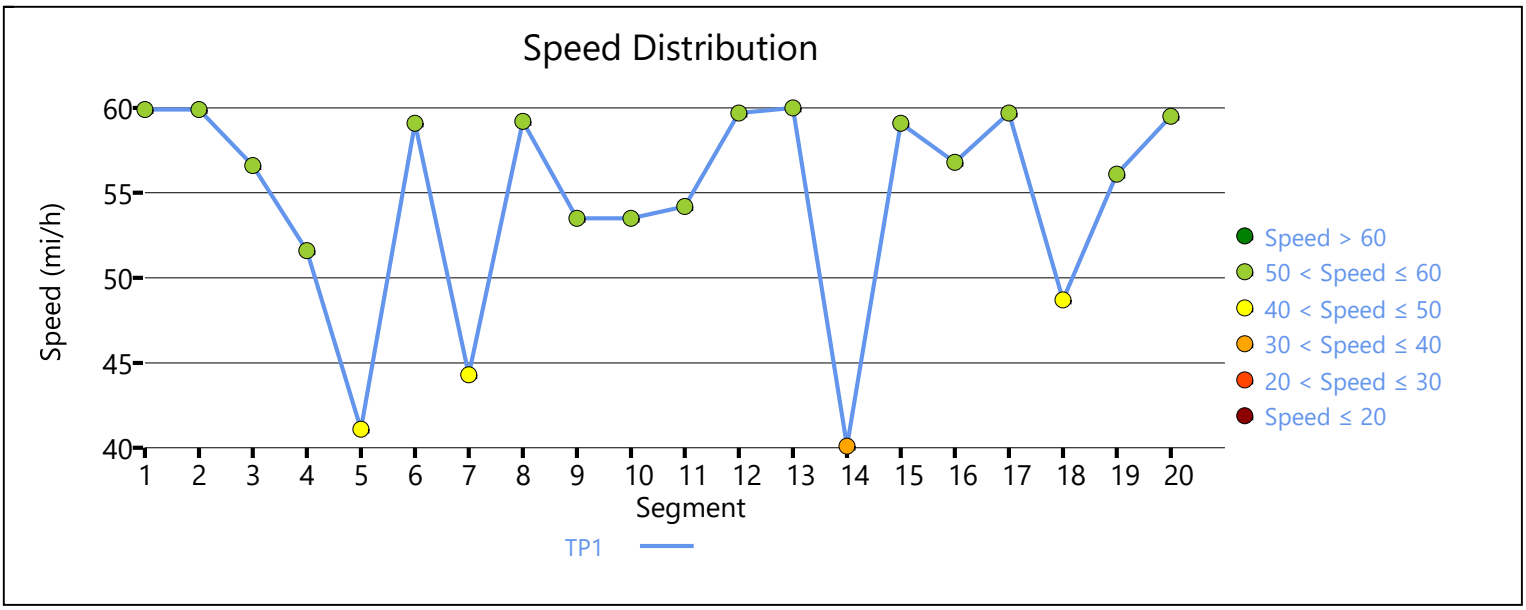
T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	50.5	32.5	30.1	7.50	D

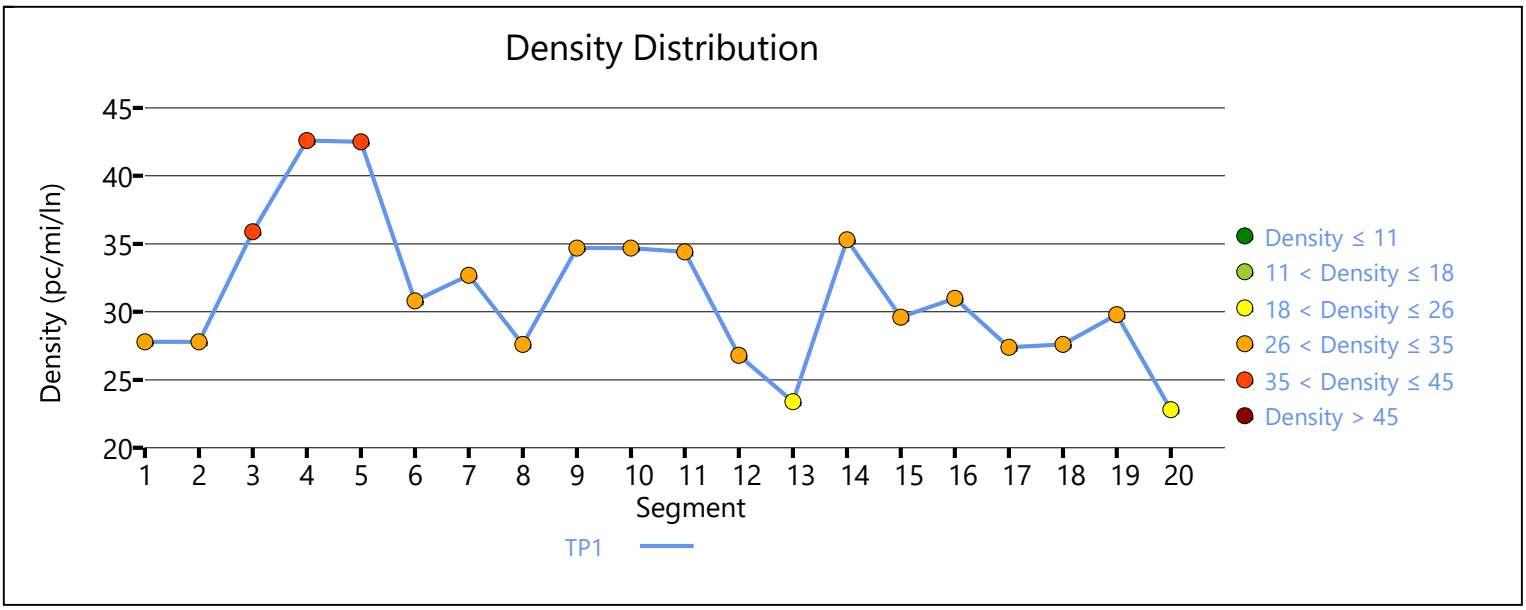
Facility Overall Results

Space Mean Speed, mi/h	50.5	Density, veh/mi/ln	30.1

Average Travel Time, min	7.50	Density, pc/mi/ln	32.5
Messages			
Comments			







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HCS7 Basic Freeway Report

Project Information

Analyst	MEL	Date	5/14/2020
Agency	Burgess & Niple	Analysis Year	2045 No-Build
Jurisdiction		Time Period Analyzed	AM Peak Southbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary
Segment Number	1	Segment Name	North of Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6020	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1664
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	27.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	2	Segment Name	Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6020	510
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.943
Flow Rate (vi),pc/h	6657	575
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.72	0.27

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	59.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	27.8
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	27.8

HCS7 Basic Freeway Report

Project Information			
Segment Number	3	Segment Name	North of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1620	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5510	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2031
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.88
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	56.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	35.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	4	Segment Name	Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1090	770
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5510	430
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	9.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.917
Flow Rate (vi),pc/h	6093	499
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.96	0.24

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.499
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2443
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	51.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.599	Outer Lanes Freeway Speed (SO), mi/h	52.6
Flow in Lanes 1 and 2 (v12), pc/h	3650	Ramp Junction Speed (S), mi/h	51.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	4149	Average Density (D), pc/mi/ln	42.6
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	32.9

HCS7 Freeway Weaving Report

Project Information

Segment Number	5	Segment Name	Glenwood On to Perkins Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	3520	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.83	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4610	280	100	1330
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	4.00	10.00	10.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.962	0.909	0.909	0.980
Flow Rate (v_i), pc/h	5098	328	117	1444
Weaving Flow Rate (v_W), pc/h	1772	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	5215	Density-Based Capacity (c_{IWL}), pc/h/ln		2179
Total Flow Rate (v), pc/h	6987	Demand Flow-Based Capacity (c_{IW}), pc/h		9449
Volume Ratio (VR)	0.254	Weaving Segment Capacity (c_W), veh/h		8388
Minimum Lane Change Rate (LC_{MIN}), lc/h	1772	Adjusted Weaving Area Capacity, pc/h		8716
Maximum Weaving Length (L_{MAX}), ft	5096	Volume-to-Capacity Ratio (v/c)		0.80

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	3365	Average Weaving Speed (S_W), mi/h	49.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2852	Average Non-Weaving Speed (S_{NW}), mi/h	38.9
Weaving Lane Change Rate (LC_W), lc/h	2587	Average Speed (S), mi/h	41.1
Weaving Lane Change Rate (LC_{All}), lc/h	5439	Density (D), pc/mi/ln	42.5
Weaving Intensity Factor (W)	0.319	Level of Service (LOS)	E

HCS7 Basic Freeway Report

Project Information			
Segment Number	6	Segment Name	North of Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1300	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4890	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1821
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.79
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	30.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	7	Segment Name	Perkins On to Butchel Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	460	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4150	290	30	740
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	2.00	2.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.952	0.980	0.980	0.971
Flow Rate (v_i), pc/h	4637	315	33	811

Weaving Flow Rate (v_W), pc/h	1126	Freeway Max Capacity (c_{IFL}), pc/h/ln	2300
Non-Weaving Flow Rate (v_{NW}), pc/h	4670	Density-Based Capacity (c_{IWL}), pc/h/ln	1993
Total Flow Rate (v), pc/h	5796	Demand Flow-Based Capacity (c_{IW}), pc/h	12371
Volume Ratio (VR)	0.194	Weaving Segment Capacity (c_W), veh/h	7624
Minimum Lane Change Rate (LC_{MIN}), lc/h	1126	Adjusted Weaving Area Capacity, pc/h	7972
Maximum Weaving Length (L_{MAX}), ft	4475	Volume-to-Capacity Ratio (v/c)	0.73

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	501	Average Weaving Speed (S_W), mi/h	42.2
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	441	Average Non-Weaving Speed (S_{NW}), mi/h	44.9
Weaving Lane Change Rate (LC_W), lc/h	1333	Average Speed (S), mi/h	44.3
Weaving Lane Change Rate (LC_{All}), lc/h	1774	Density (D), pc/mi/ln	32.7
Weaving Intensity Factor (W)	0.656	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information			
Segment Number	8	Segment Name	North of Carroll On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2180	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4440	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1654
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	27.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	9	Segment Name	Caroll On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1280	700
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4440	560
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.971
Flow Rate (vi),pc/h	4962	614
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.81	0.29

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.397
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2000
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	52.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.597	Outer Lanes Freeway Speed (SO), mi/h	54.6
Flow in Lanes 1 and 2 (v12), pc/h	2962	Ramp Junction Speed (S), mi/h	53.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	3576	Average Density (D), pc/mi/ln	34.7
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	28.8

HCS7 Overlap Freeway Report

Project Information			
Segment Number	10	Segment Name	Carroll On to I-76 Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	220	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5000	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1862
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.81
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	53.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	34.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Diverge Report

Project Information

Segment Number	11	Segment Name	I-76 Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	2
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1280	0
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	5000	2120
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.952	0.971
Flow Rate (v_i),pc/h	5587	2323
Capacity (c), pc/h	6900	4200
Volume-to-Capacity Ratio (v/c)	0.81	0.55

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	1
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.507
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1795
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	50.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.450	Outer Lanes Freeway Speed (S_O), mi/h	62.7
Flow in Lanes 1 and 2 (v_{12}), pc/h	3792	Ramp Junction Speed (S), mi/h	54.2
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	34.4
Level of Service (LOS)	E	Density in Ramp Influence Area (D_R), pc/mi/ln	36.9

HCS7 Basic Freeway Report

Project Information			
Segment Number	12	Segment Name	North of EB I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	2500	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	2880	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1609
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.70
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	26.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	13	Segment Name	EB I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	130	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2880	870
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.935
Flow Rate (vi),pc/h	3218	990
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.61	0.47

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	23.4
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	23.4

HCS7 Freeway Weaving Report

Project Information

Segment Number	14	Segment Name	I-76 On to Archwood Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1780	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3410	1230	70	340
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	7.00	7.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.952	0.935	0.935	0.971
Flow Rate (v_i), pc/h	3811	1399	80	373
Weaving Flow Rate (v_W), pc/h	1772	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	3891	Density-Based Capacity (c_{IWL}), pc/h/ln		1998
Total Flow Rate (v), pc/h	5663	Demand Flow-Based Capacity (c_{IW}), pc/h		7668
Volume Ratio (VR)	0.313	Weaving Segment Capacity (c_W), veh/h		7275
Minimum Lane Change Rate (LC_{MIN}), lc/h	2145	Adjusted Weaving Area Capacity, pc/h		7668
Maximum Weaving Length (L_{MAX}), ft	5724	Volume-to-Capacity Ratio (v/c)		0.74

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1501	Average Weaving Speed (S_W), mi/h	46.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1479	Average Non-Weaving Speed (S_{NW}), mi/h	37.8
Weaving Lane Change Rate (LC_W), lc/h	2749	Average Speed (S), mi/h	40.1
Weaving Lane Change Rate (LC_{All}), lc/h	4228	Density (D), pc/mi/ln	35.3
Weaving Intensity Factor (W)	0.447	Level of Service (LOS)	E

HCS7 Basic Freeway Report

Project Information			
Segment Number	15	Segment Name	North of Wilbreth Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	690	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4640	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1760
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.77
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Diverge Report

Project Information

Segment Number	16	Segment Name	Wilbreth Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	540
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4640	310
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	7.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.935	0.962
Flow Rate (vi),pc/h	5279	343
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.77	0.16

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.329
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1915
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.612	Outer Lanes Freeway Speed (SO), mi/h	62.3
Flow in Lanes 1 and 2 (v12), pc/h	3364	Ramp Junction Speed (S), mi/h	56.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	31.0
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	28.3

HCS7 Basic Freeway Report

Project Information			
Segment Number	17	Segment Name	North of Wilbreth On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1530	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4330	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1642
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.71
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	27.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	18	Segment Name	Wilbreth on to Waterloo off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1740	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4050	360	60	280
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	7.00	3.00	3.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.935	0.971	0.971	0.971
Flow Rate (v_i), pc/h	4608	394	66	307
Weaving Flow Rate (v_W), pc/h	701	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	4674	Density-Based Capacity (c_{IWL}), pc/h/ln		2140
Total Flow Rate (v), pc/h	5375	Demand Flow-Based Capacity (c_{IW}), pc/h		18462
Volume Ratio (VR)	0.130	Weaving Segment Capacity (c_W), veh/h		8048
Minimum Lane Change Rate (LC_{MIN}), lc/h	701	Adjusted Weaving Area Capacity, pc/h		8560
Maximum Weaving Length (L_{MAX}), ft	3833	Volume-to-Capacity Ratio (v/c)		0.63

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1220	Average Weaving Speed (S_W), mi/h	50.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1136	Average Non-Weaving Speed (S_{NW}), mi/h	48.5
Weaving Lane Change Rate (LC_W), lc/h	1194	Average Speed (S), mi/h	48.7
Weaving Lane Change Rate (LC_{All}), lc/h	2330	Density (D), pc/mi/ln	27.6
Weaving Intensity Factor (W)	0.285	Level of Service (LOS)	C

HCS7 Freeway Diverge Report

Project Information

Segment Number	19	Segment Name	277 WB Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	540	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4410	810
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	7.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.935	0.935
Flow Rate (vi),pc/h	5018	922
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.73	0.44

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.381
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1671
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	53.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.592	Outer Lanes Freeway Speed (SO), mi/h	63.2
Flow in Lanes 1 and 2 (v12), pc/h	3347	Ramp Junction Speed (S), mi/h	56.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	29.8
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	28.5

HCS7 Basic Freeway Report

Project Information

Segment Number	20	Segment Name	South of 277 WB Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3600	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1365
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.59
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

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I-77 Southbound

PM No-Build

HCS Facilities and Segment Output

HCS7 Freeway Facilities Report

Project Information

Analyst	MEL	Date	5/14/2020
Agency	Burgess & Niple	Analysis Year	2045 No-Build
Jurisdiction		Time Period Analyzed	PM Peak Southbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary

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	20
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	6.33		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	North of Tallmadge Off-Ramp	2000	4
2	Diverge	Basic	Tallmadge Off-Ramp	1500	4
3	Basic	Basic	North of Tallmadge On-Ramp	1620	3
4	Merge	Merge	Tallmadge On-Ramp	1090	3
5	Weaving	Weaving	Glenwood On to Perkins Off	4680	4
6	Basic	Basic	North of Perkins On-Ramp	1300	3
7	Weaving	Weaving	Perkins On to Butchel Off	1460	4
8	Basic	Basic	North of Carroll On-Ramp	2180	3
9	Merge	Merge	Caroll On-Ramp	1280	3
10	Overlap	Overlap	Carroll On to I-76 Off	220	3
11	Diverge	Diverge	I-76 Off-Ramp	1280	3
12	Basic	Basic	North of EB I-76 On-Ramp	2500	2
13	Merge	Basic	EB I-76 On-Ramp	130	3
14	Weaving	Weaving	I-76 On to Archwood Off	3180	4
15	Basic	Basic	North of Wilbreth Off-Ramp	690	3
16	Diverge	Diverge	Wilbreth Off-Ramp	1500	3
17	Basic	Basic	North of Wilbreth On-ramp	1530	3
18	Weaving	Weaving	Wilbreth on to Waterloo off	2740	4
19	Diverge	Diverge	277 WB Off-Ramp	540	3
20	Basic	Basic	South of 277 WB Off-Ramp	2000	3

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5347	9200	0.58	60.0	22.3	C

Segment 2: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.962	5347	719	9200	2100	0.58	0.34	58.4	58.4	22.9	22.9	C
Segment 3: Basic															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.971		4628		6900		0.67		59.9		25.7		C
Segment 4: Merge															
Time Period	**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	Freeway	Ramp	
1	0.94	0.94	0.971	0.980	4980	488	6900	2100	0.74	0.23	54.3	53.8	30.6	25.3	C
Segment 5: Weaving															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.971		5246		9088		0.62		49.9		26.3		C
Segment 6: Basic															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.971		4797		6900		0.75		59.9		26.7		D
Segment 7: Weaving															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.971		5067		7912		0.74		47.8		26.5		C
Segment 8: Basic															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.971		4399		6900		0.75		59.4		24.4		C
Segment 9: Merge															
Time Period	**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	Freeway	Ramp	
1	0.94	0.94	0.971	0.971	4764	1249	6900	2100	0.94	0.59	54.3	53.4	29.2	26.7	C
Segment 10: Overlap															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.971		4764		6900		0.94		54.3		29.2		D
Segment 11: Diverge															
Time Period	**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	Freeway	Ramp	
1	0.94	0.94	0.971	0.971	4764	2016	6900	4200	0.94	0.48	54.8	51.4	29.0	32.2	D
Segment 12: Basic															

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	2748	4600	0.96	59.8	22.9	C

Segment 13: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.962	3120	1681	6900	2100	0.89	0.80	54.5	54.5	19.1	19.1	C

Segment 14: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	3403	8264	0.92	51.8	16.4	B

Segment 15: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	2986	6900	1.04	59.6	16.6	F

Segment 16: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.962	2986	409	6900	2100	1.04	0.19	56.9	54.0	17.5	17.7	F

Segment 17: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	2577	6900	0.98	59.7	14.3	B

Segment 18: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	2848	8588	0.87	54.5	13.1	B

Segment 19: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.943	2431	1342	6600	2100	1.07	0.64	54.3	52.5	14.9	17.3	F

Segment 20: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	1089	6900	0.84	59.3	6.1	A

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	55.0	21.3	20.6	6.90	F

Facility Overall Results

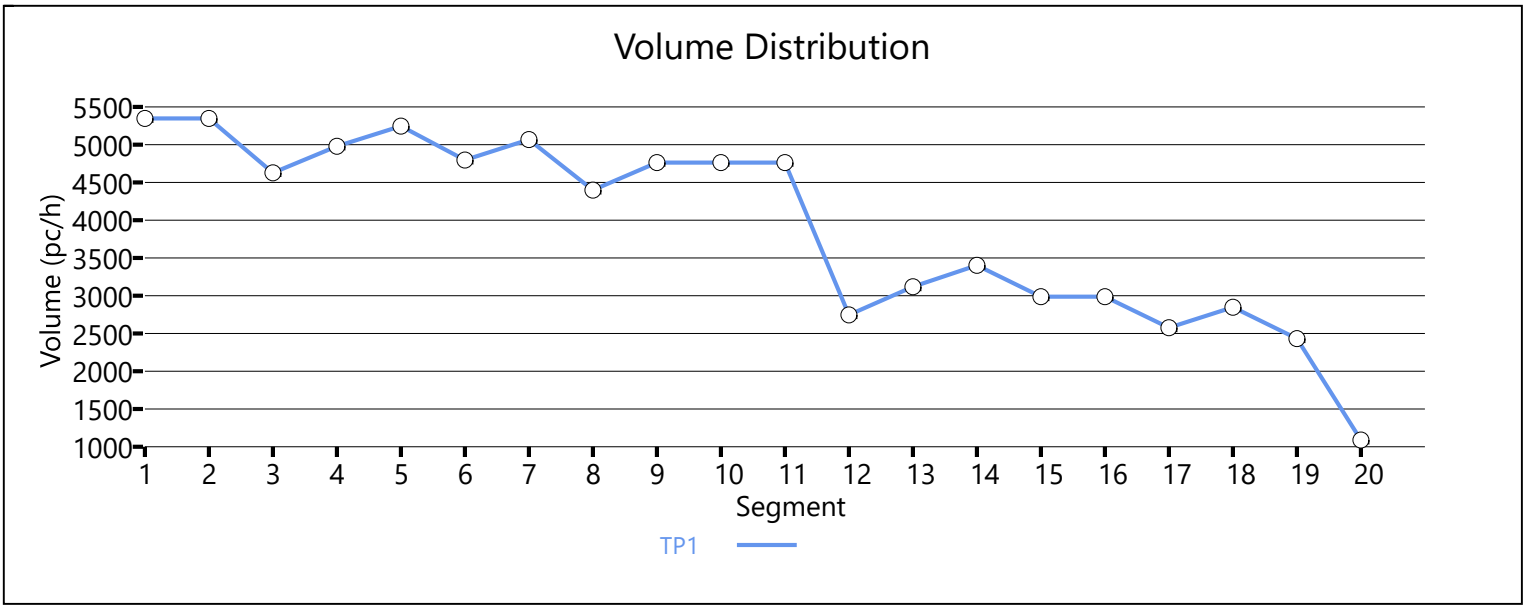
Space Mean Speed, mi/h	55.0	Density, veh/mi/ln	20.6

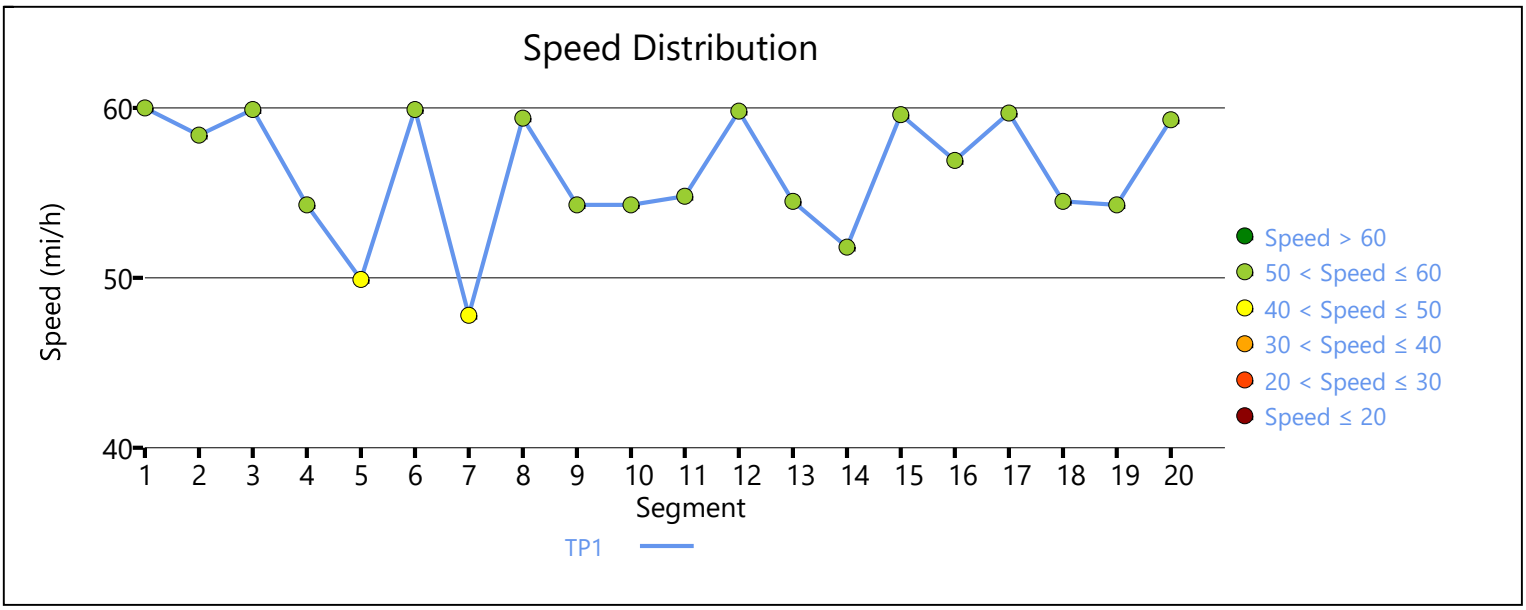
Average Travel Time, min	6.90	Density, pc/mi/ln	21.3

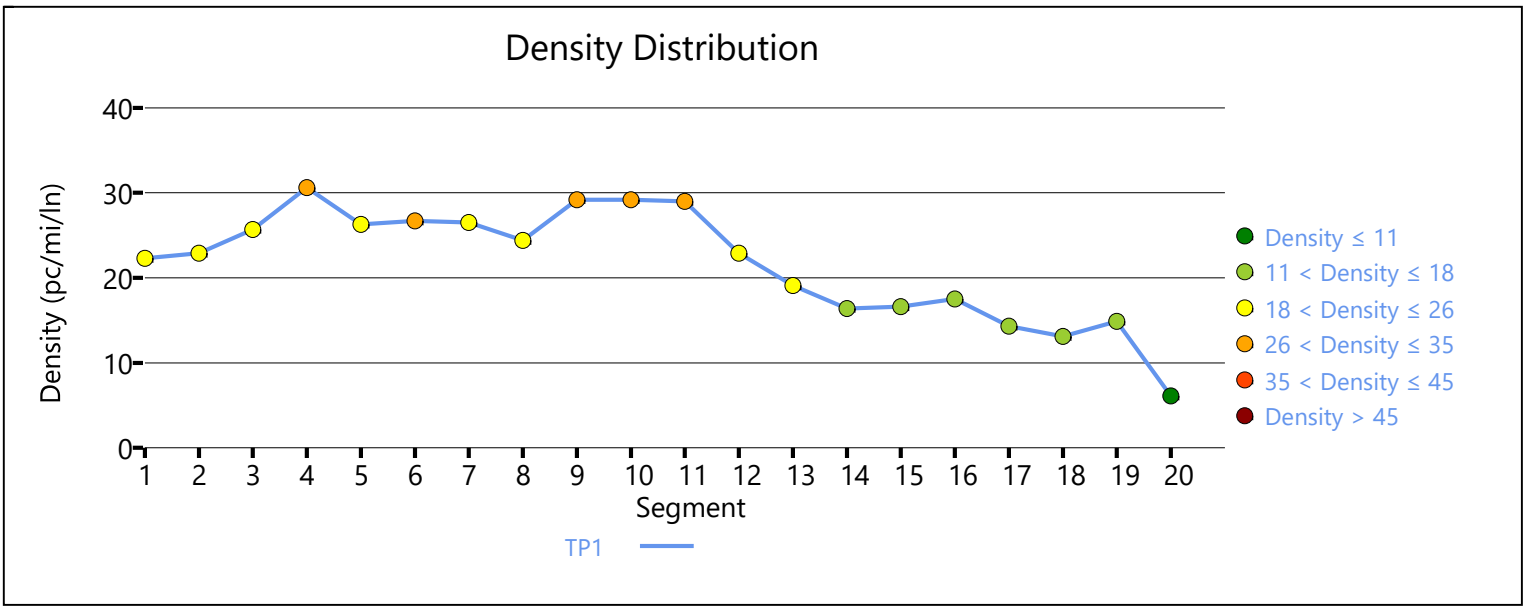
Messages

WARNING 1	Oversaturated conditions currently exist in boundary time period 1. Results may not be reliable. Consider expanding analysis in time and/or space to resolve this warning.
WARNING 2	Oversaturated conditions currently exist on segment 10, which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning.
WARNING 3	Oversaturated conditions currently exist on segment 13, which is less than 300 feet. Due to time step size, these segments may produce unreliable results. Consider reviewing facility segmentation to resolve this warning.

Comments







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HCS7 Basic Freeway Report

Project Information			
Analyst	MEL	Date	5/14/2020
Agency	Burgess & Niple	Analysis Year	2045 No-Build
Jurisdiction		Time Period Analyzed	PM Peak Southbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary
Segment Number	1	Segment Name	North of Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity			
Demand Volume veh/h	4880	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1337
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.58
Passenger Car Equivalent (E_T)	2.000		

Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	60.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	2	Segment Name	Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	0
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4880	650
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	5347	719
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.58	0.34

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.363
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1305
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	58.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	64.6
Flow in Lanes 1 and 2 (v12), pc/h	2737	Ramp Junction Speed (S), mi/h	58.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	22.9
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	22.9

HCS7 Basic Freeway Report

Project Information			
Segment Number	3	Segment Name	North of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1620	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4230	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1543
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	4	Segment Name	Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1090	770
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4230	450
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.980
Flow Rate (vi),pc/h	4634	488
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.72	0.23

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.345
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1801
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	53.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.599	Outer Lanes Freeway Speed (SO), mi/h	55.3
Flow in Lanes 1 and 2 (v12), pc/h	2691	Ramp Junction Speed (S), mi/h	54.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	3179	Average Density (D), pc/mi/ln	30.6
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	25.3

HCS7 Freeway Weaving Report

Project Information

Segment Number	5	Segment Name	Glenwood On to Perkins Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	3520	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.83	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4340	360	70	340
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.980	0.980	0.980
Flow Rate (v_i), pc/h	4621	190	76	359

Weaving Flow Rate (v_W), pc/h	549	Freeway Max Capacity (c_{IFL}), pc/h/ln	2300
Non-Weaving Flow Rate (v_{NW}), pc/h	4697	Density-Based Capacity (c_{IWL}), pc/h/ln	2272
Total Flow Rate (v), pc/h	5246	Demand Flow-Based Capacity (c_{IW}), pc/h	17647
Volume Ratio (VR)	0.136	Weaving Segment Capacity (c_W), veh/h	8837
Minimum Lane Change Rate (LC_{MIN}), lc/h	549	Adjusted Weaving Area Capacity, pc/h	9088
Maximum Weaving Length (L_{MAX}), ft	3892	Volume-to-Capacity Ratio (v/c)	0.58

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	3031	Average Weaving Speed (S_W), mi/h	50.9
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2737	Average Non-Weaving Speed (S_{NW}), mi/h	49.8
Weaving Lane Change Rate (LC_W), lc/h	1364	Average Speed (S), mi/h	49.9
Weaving Lane Change Rate (LC_{All}), lc/h	4101	Density (D), pc/mi/ln	26.3
Weaving Intensity Factor (W)	0.255	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information			
Segment Number	6	Segment Name	North of Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1300	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4700	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1599
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.70
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	26.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	7	Segment Name	Perkins On to Butchel Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	460	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4150	600	60	550
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	1.00	1.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.990	0.990	0.971
Flow Rate (v_i), pc/h	4235	206	64	562
Weaving Flow Rate (v_W), pc/h	768	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	4299	Density-Based Capacity (c_{IWL}), pc/h/ln		1978
Total Flow Rate (v), pc/h	5067	Demand Flow-Based Capacity (c_{IW}), pc/h		11268
Volume Ratio (VR)	0.213	Weaving Segment Capacity (c_W), veh/h		7701
Minimum Lane Change Rate (LC_{MIN}), lc/h	768	Adjusted Weaving Area Capacity, pc/h		7912
Maximum Weaving Length (L_{MAX}), ft	4670	Volume-to-Capacity Ratio (v/c)		0.64

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	461	Average Weaving Speed (S_W), mi/h	44.5
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	365	Average Non-Weaving Speed (S_{NW}), mi/h	48.4
Weaving Lane Change Rate (LC_W), lc/h	975	Average Speed (S), mi/h	47.8
Weaving Lane Change Rate (LC_{All}), lc/h	1340	Density (D), pc/mi/ln	26.5
Weaving Intensity Factor (W)	0.525	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information			
Segment Number	8	Segment Name	North of Carroll On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2180	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4750	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1466
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.64
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.4
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	24.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	9	Segment Name	Caroll On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1280	700
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4750	1140
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.971
Flow Rate (vi),pc/h	5204	1249
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.69	0.59

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.369
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1417
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	53.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.597	Outer Lanes Freeway Speed (SO), mi/h	56.7
Flow in Lanes 1 and 2 (v12), pc/h	2098	Ramp Junction Speed (S), mi/h	54.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	3347	Average Density (D), pc/mi/ln	29.2
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	26.7

HCS7 Overlap Freeway Report

Project Information			
Segment Number	10	Segment Name	Carroll On to I-76 Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	220	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5890	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1588
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.69
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	54.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Diverge Report

Project Information

Segment Number	11	Segment Name	I-76 Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	2
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1280	0
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5890	1840
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.971
Flow Rate (vi),pc/h	6453	2016
Capacity (c), pc/h	6900	4200
Volume-to-Capacity Ratio (v/c)	0.69	0.48

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.479
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1511
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	51.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.450	Outer Lanes Freeway Speed (SO), mi/h	63.8
Flow in Lanes 1 and 2 (v12), pc/h	3253	Ramp Junction Speed (S), mi/h	54.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	29.0
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	32.2

HCS7 Basic Freeway Report

Project Information			
Segment Number	12	Segment Name	North of EB I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	2500	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4050	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1374
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.60
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	13	Segment Name	EB I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	130	0
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4050	1520
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	4437	1681
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.45	0.80

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.369
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	607
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	54.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.578	Outer Lanes Freeway Speed (SO), mi/h	59.6
Flow in Lanes 1 and 2 (v12), pc/h	832	Ramp Junction Speed (S), mi/h	54.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	2513	Average Density (D), pc/mi/ln	19.1
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	19.1

HCS7 Freeway Weaving Report

Project Information

Segment Number	14	Segment Name	I-76 On to Archwood Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1780	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5260	1270	70	310
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	4.00	4.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.962	0.962	0.980
Flow Rate (v_i), pc/h	2948	206	77	172
Weaving Flow Rate (v_W), pc/h	378	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	3025	Density-Based Capacity (c_{IWL}), pc/h/ln		2066
Total Flow Rate (v), pc/h	3403	Demand Flow-Based Capacity (c_{IW}), pc/h		10435
Volume Ratio (VR)	0.230	Weaving Segment Capacity (c_W), veh/h		8013
Minimum Lane Change Rate (LC_{MIN}), lc/h	551	Adjusted Weaving Area Capacity, pc/h		8264
Maximum Weaving Length (L_{MAX}), ft	4845	Volume-to-Capacity Ratio (v/c)		0.41

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1167	Average Weaving Speed (S_W), mi/h	51.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	817	Average Non-Weaving Speed (S_{NW}), mi/h	51.9
Weaving Lane Change Rate (LC_W), lc/h	1155	Average Speed (S), mi/h	51.8
Weaving Lane Change Rate (LC_{All}), lc/h	1972	Density (D), pc/mi/ln	16.4
Weaving Intensity Factor (W)	0.245	Level of Service (LOS)	B

HCS7 Basic Freeway Report

Project Information			
Segment Number	15	Segment Name	North of Wilbreth Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	690	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6530	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	995
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.43
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	16.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Diverge Report

Project Information

Segment Number	16	Segment Name	Wilbreth Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	540
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6530	370
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	7154	409
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.43	0.19

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.335
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	858
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.667	Outer Lanes Freeway Speed (SO), mi/h	65.8
Flow in Lanes 1 and 2 (v12), pc/h	2128	Ramp Junction Speed (S), mi/h	56.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	17.5
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	17.7

HCS7 Basic Freeway Report

Project Information			
Segment Number	17	Segment Name	North of Wilbreth On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1530	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6160	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	859
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.37
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	14.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	18	Segment Name	Wilbreth on to Waterloo off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1740	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5890	560	110	270
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	1.00	1.00	1.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.990	0.990	0.990
Flow Rate (v_i), pc/h	2467	152	118	111
Weaving Flow Rate (v_W), pc/h	263	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	2585	Density-Based Capacity (c_{IWL}), pc/h/ln		2147
Total Flow Rate (v), pc/h	2848	Demand Flow-Based Capacity (c_{IW}), pc/h		20000
Volume Ratio (VR)	0.120	Weaving Segment Capacity (c_W), veh/h		8361
Minimum Lane Change Rate (LC_{MIN}), lc/h	263	Adjusted Weaving Area Capacity, pc/h		8588
Maximum Weaving Length (L_{MAX}), ft	3735	Volume-to-Capacity Ratio (v/c)		0.33

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	675	Average Weaving Speed (S_W), mi/h	52.6
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	705	Average Non-Weaving Speed (S_{NW}), mi/h	54.7
Weaving Lane Change Rate (LC_W), lc/h	756	Average Speed (S), mi/h	54.5
Weaving Lane Change Rate (LC_{All}), lc/h	1461	Density (D), pc/mi/ln	13.1
Weaving Intensity Factor (W)	0.197	Level of Service (LOS)	B

HCS7 Freeway Diverge Report

Project Information

Segment Number	19	Segment Name	277 WB Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	540	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Highway/CD Roadway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6450	1190
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.943
Flow Rate (vi),pc/h	7067	1342
Capacity (c), pc/h	6600	2100
Volume-to-Capacity Ratio (v/c)	0.37	0.64

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.419
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	395
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	52.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.637	Outer Lanes Freeway Speed (SO), mi/h	65.8
Flow in Lanes 1 and 2 (v12), pc/h	2036	Ramp Junction Speed (S), mi/h	54.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	14.9
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	17.3

HCS7 Basic Freeway Report

Project Information

Segment Number	20	Segment Name	South of 277 WB Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5260	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	363
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.16
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.3
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	6.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

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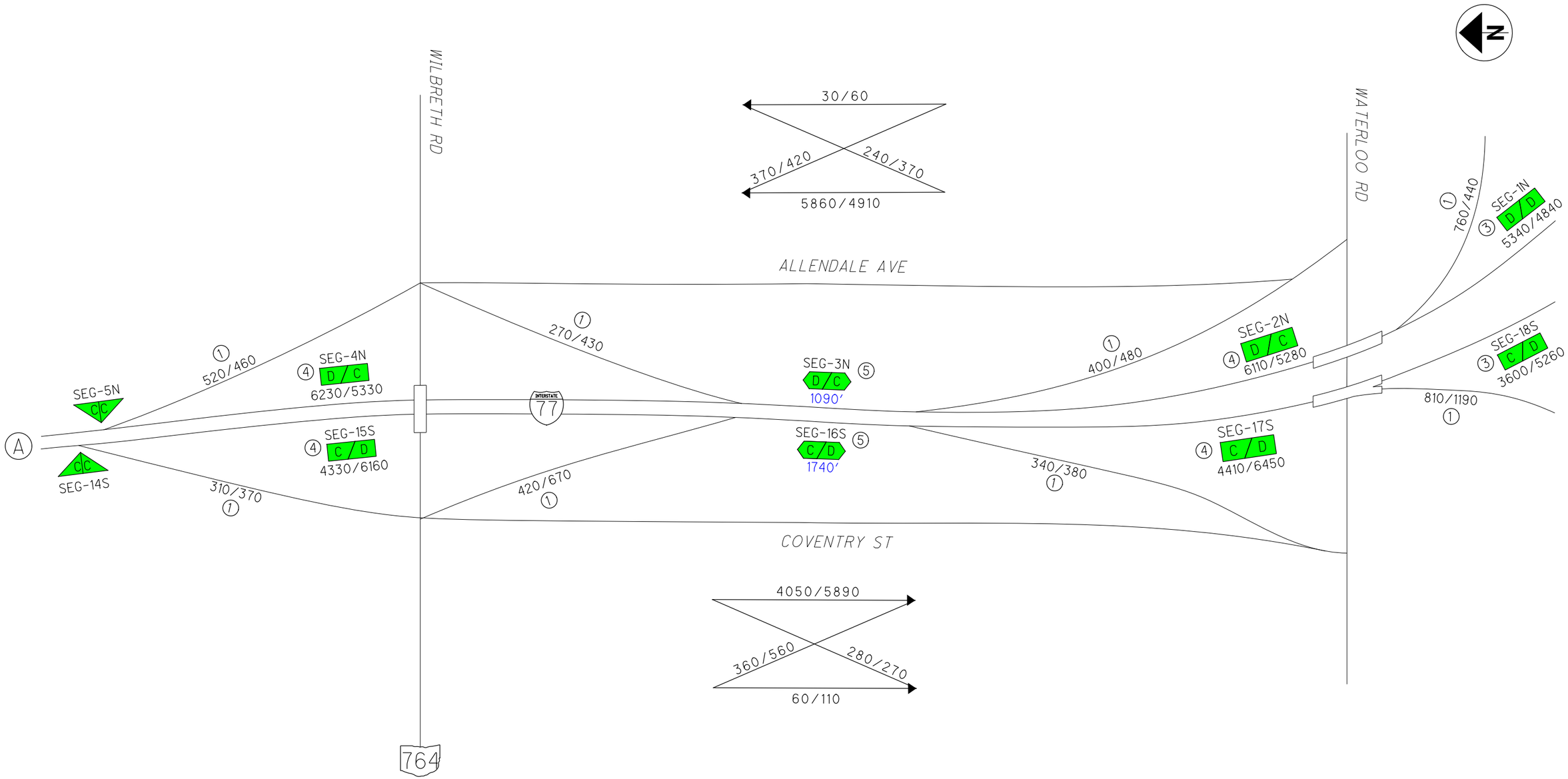
Appendix F

Interim Build Freeway Analysis



Text Style

AM/PM Traffic Volume
Weave Segment Short Length
(X) = # of Lanes

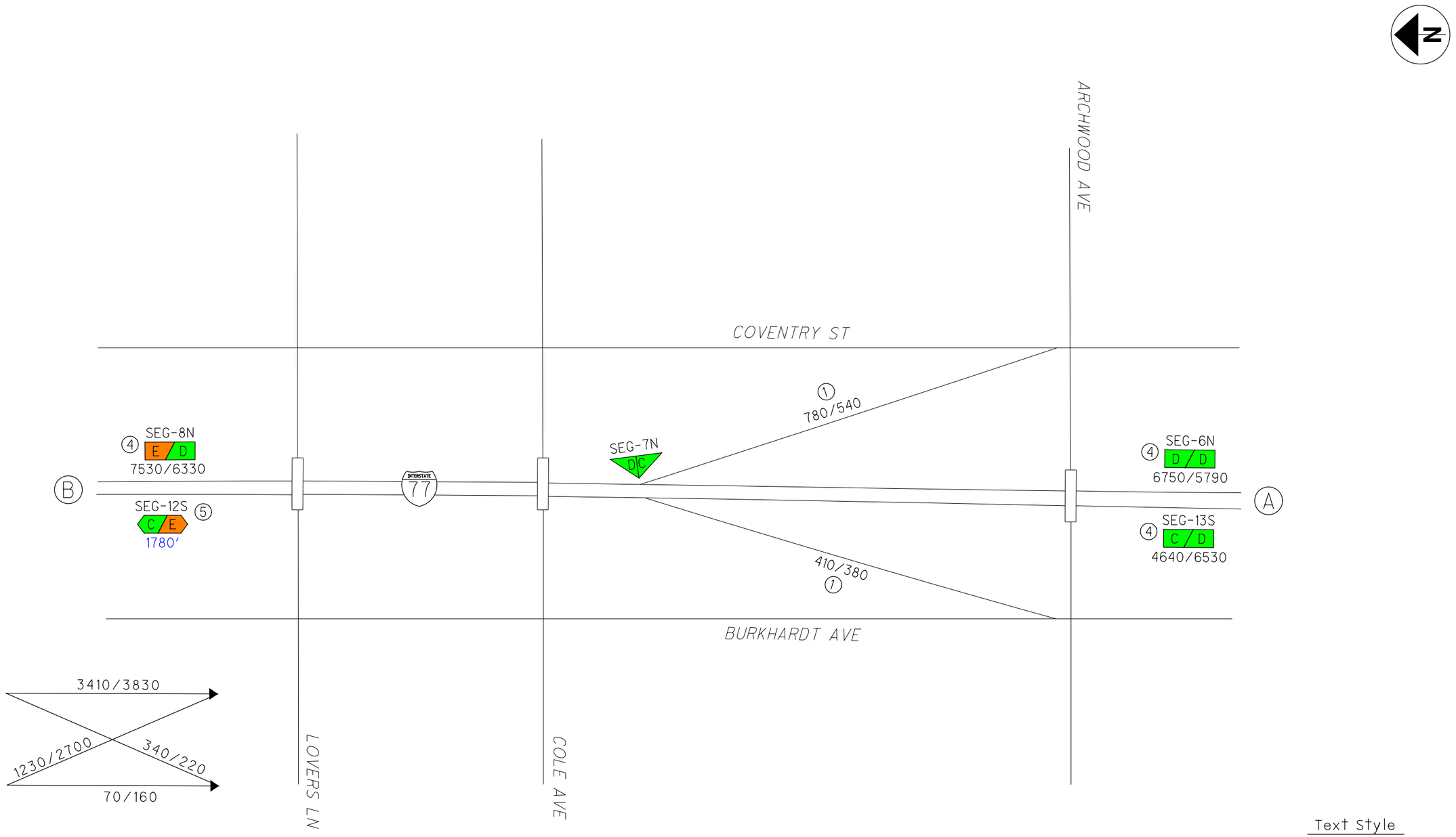
Location Type

- Freeway Segment
- Weave Segment
- Merge/Diverge

LOS Guide

- LOS A - D
- LOS E
- LOS F

LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM INTERIM BUILD



Text Style

AM/PM Traffic Volume
Weave Segment Short Length
(X) = # of Lanes

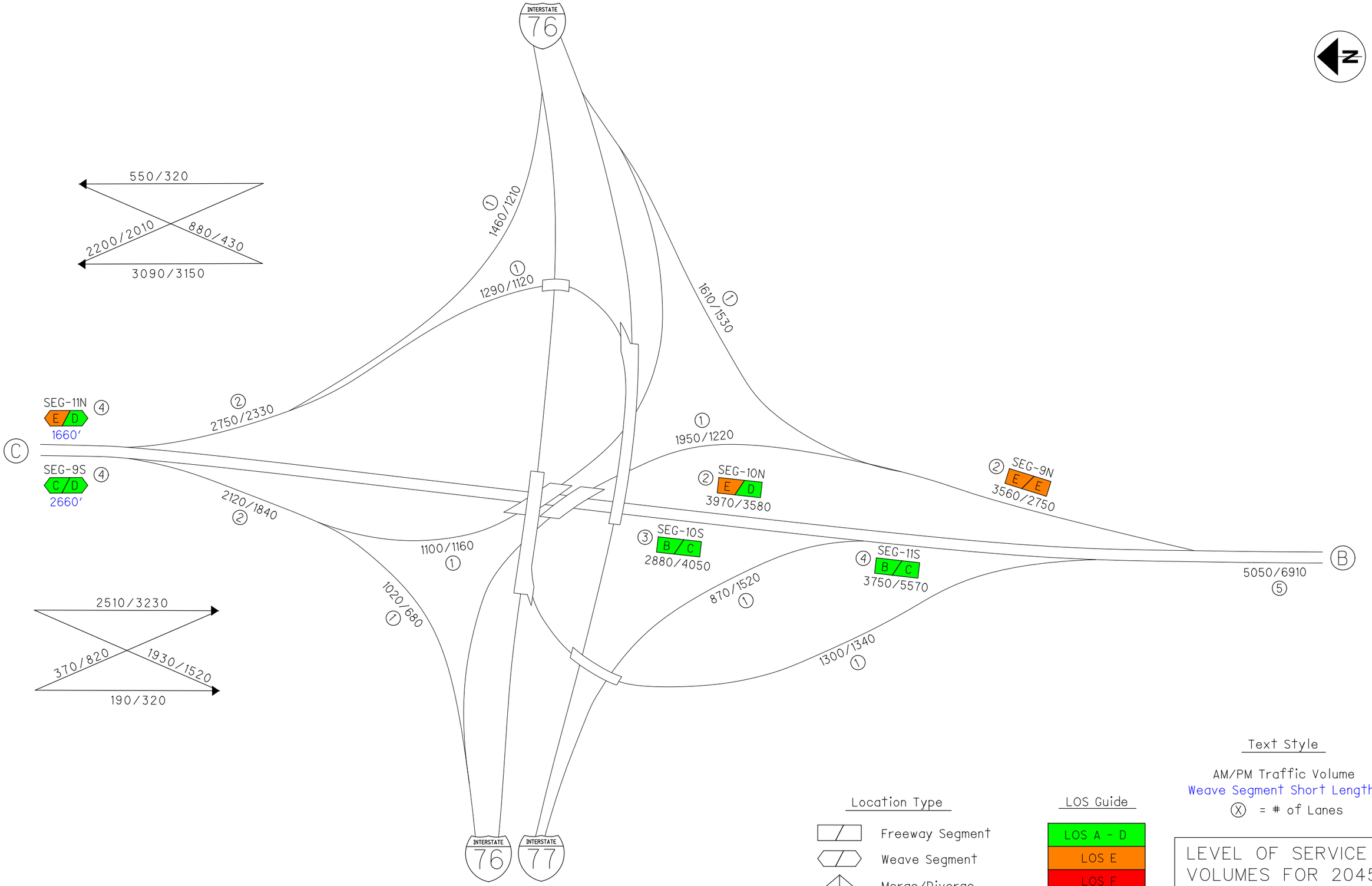
Location Type

- Freeway Segment
- Weave Segment
- Merge/Diverge

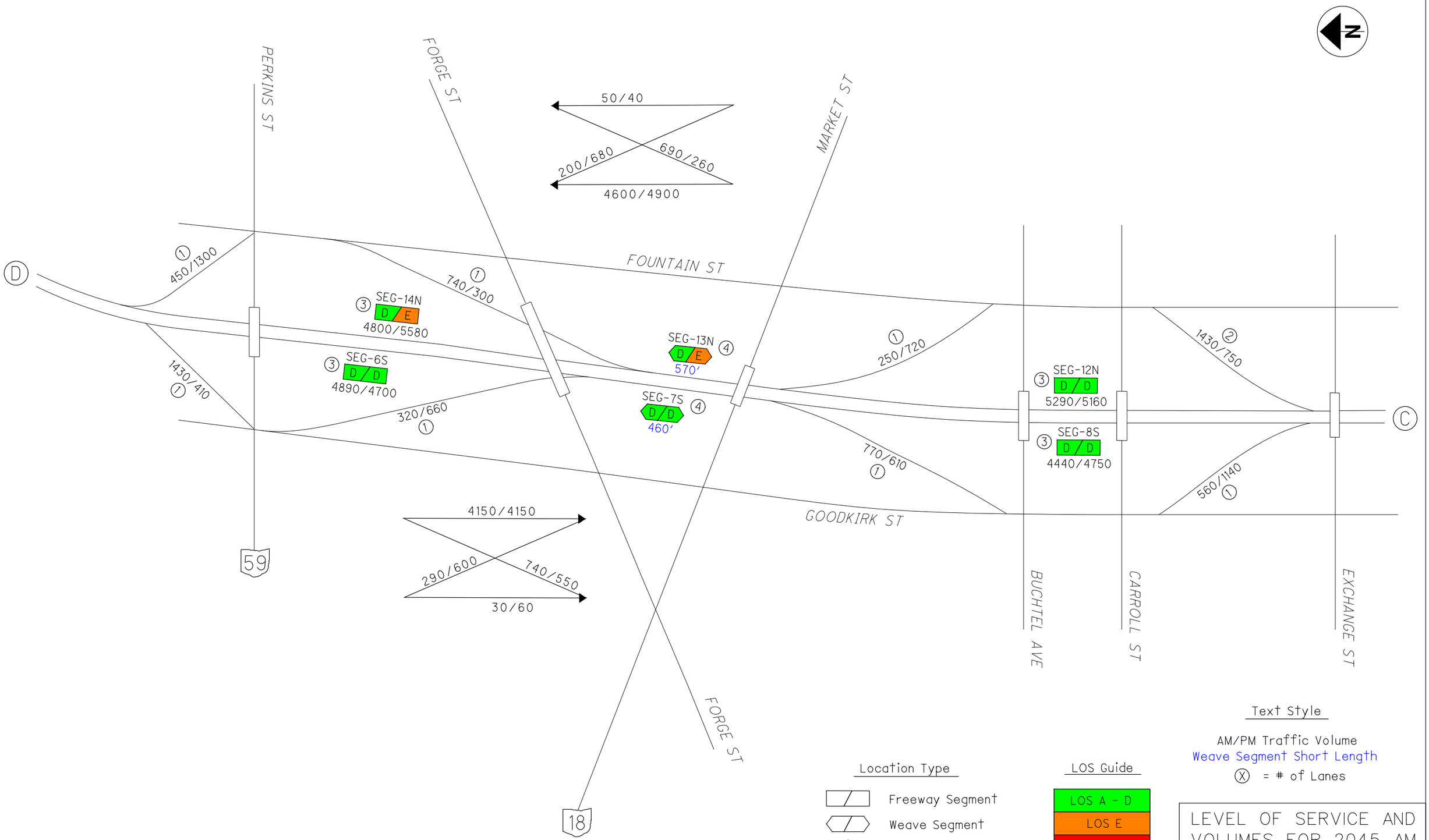
LOS Guide

- LOS A - D
- LOS E
- LOS F

LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM INTERIM BUILD



LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM INTERIM BUILD



LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM INTERIM BUILD

LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM INTERIM BUILD

I-77 Northbound

AM Interim Build

HCS Facilities and Segment Output

HCS7 Freeway Facilities Report

Project Information

Analyst	MEL	Date	5/18/2020
Agency	Burgess & Niple	Analysis Year	2045 Interim Build
Jurisdiction		Time Period Analyzed	AM Peak Northbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary

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	19
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	6.36		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	South of WB I-277 On-ramp	2000	3
2	Merge	Basic	WB I-277 On-ramp	1080	4
3	Weaving	Weaving	Waterloo On to Wilbreth Off	2090	5
4	Basic	Basic	South of Wilbreth On	1880	4
5	Merge	Merge	Wilbreth On-ramp	1500	4
6	Basic	Basic	South of Archwood On-Ramp	1560	4
7	Merge	Merge	Archwood On-ramp	500	4
8	Overlap	Overlap	Archwood On to I-76 Off	1000	4
9	Diverge	Diverge	I-76 Off-ramp	500	4
10	Basic	Basic	South of I-76 On-Ramp	2840	2
11	Weaving	Weaving	I-76 On to Carroll Off	3370	4
12	Basic	Basic	South of Butchel On-Ramp	1640	3
13	Weaving	Weaving	Butchel On to Perkins Off	1570	4
14	Basic	Basic	South of Perkins On-Ramp	1350	3
15	Weaving	Weaving	Perkins On to Glenwood Off	4200	4
16	Diverge	Diverge	Tallmadge Off-Ramp	1010	3
17	Basic	Basic	South of Tallmadge On-Ramp	2010	3
18	Merge	Basic	Tallmadge On-Ramp	1500	4
19	Basic	Basic	North of Tallmadge On-Ramp	2000	4

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5851	6900	0.85	57.8	33.7	D

Segment 2: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.962	6691	840	9200	2100	0.73	0.40	59.8	59.9	27.9	27.9	D

Segment 3: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	7125	10585	0.67	48.2	29.6	D

Segment 4: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	6826	9200	0.74	59.5	28.5	D

Segment 5: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.962	7401	575	9200	2100	0.80	0.27	53.9	53.3	34.3	27.3	C

Segment 6: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	7327	9200	0.80	59.0	31.1	D

Segment 7: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.971	8182	855	9200	2100	0.89	0.41	53.0	51.9	38.6	31.6	D

Segment 8: Overlap

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	8174	8968	0.91	53.1	38.8	E

Segment 9: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.952	8250	3978	9200	4200	0.90	0.95	53.1	48.2	38.8	48.0	E

Segment 10: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	4310	4600	0.94	54.4	39.6	E

Segment 11: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	7368	7576	0.97	45.8	40.2	E

Segment 12: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5796	6900	0.84	58.0	33.3	D

Segment 13: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	6060	8113	0.75	45.5	33.3	D

Segment 14: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5259	6900	0.76	58.6	29.4	D

Segment 15: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5774	8768	0.66	45.4	31.8	D

Segment 16: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.980	5010	532	6900	2100	0.73	0.25	56.7	53.8	29.5	26.9	C

Segment 17: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	4468	6900	0.65	59.7	24.8	C

Segment 18: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.952	4859	391	9200	2100	0.53	0.19	60.0	60.0	20.2	20.2	C

Segment 19: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	4855	9200	0.53	60.0	20.2	C

Facility Time Period Results

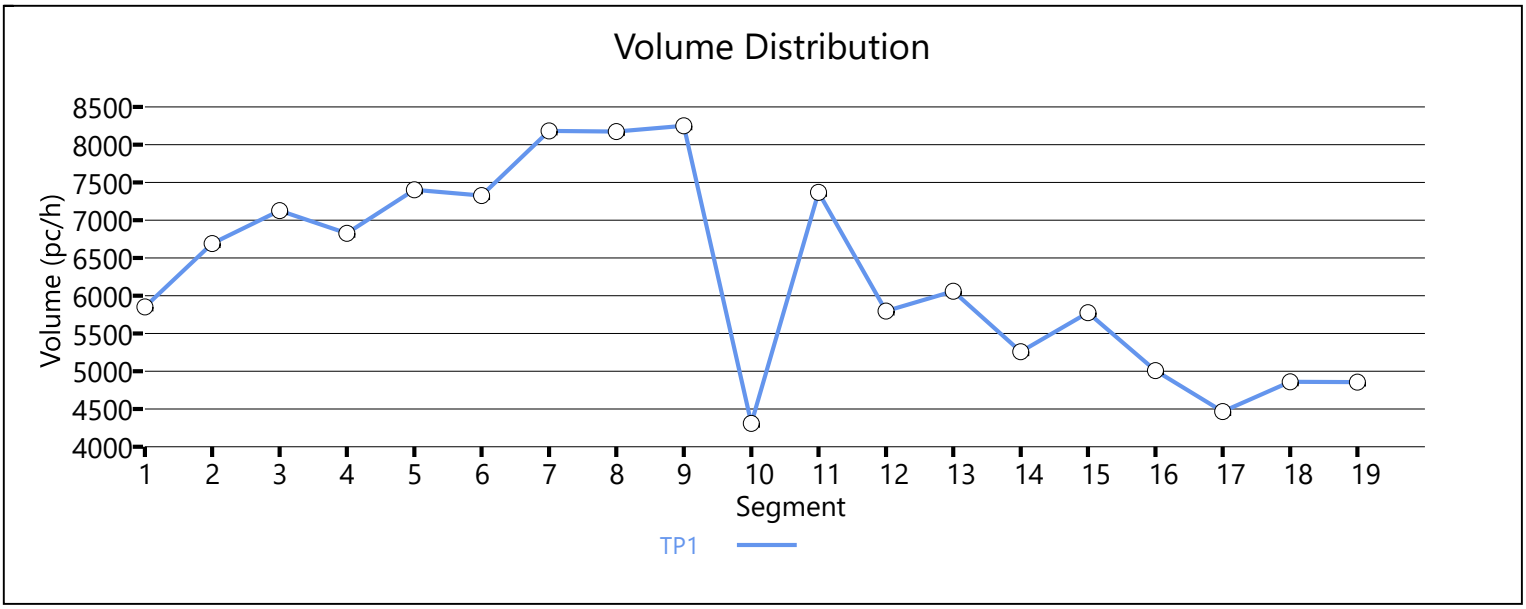
T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	52.7	31.5	29.9	7.30	D

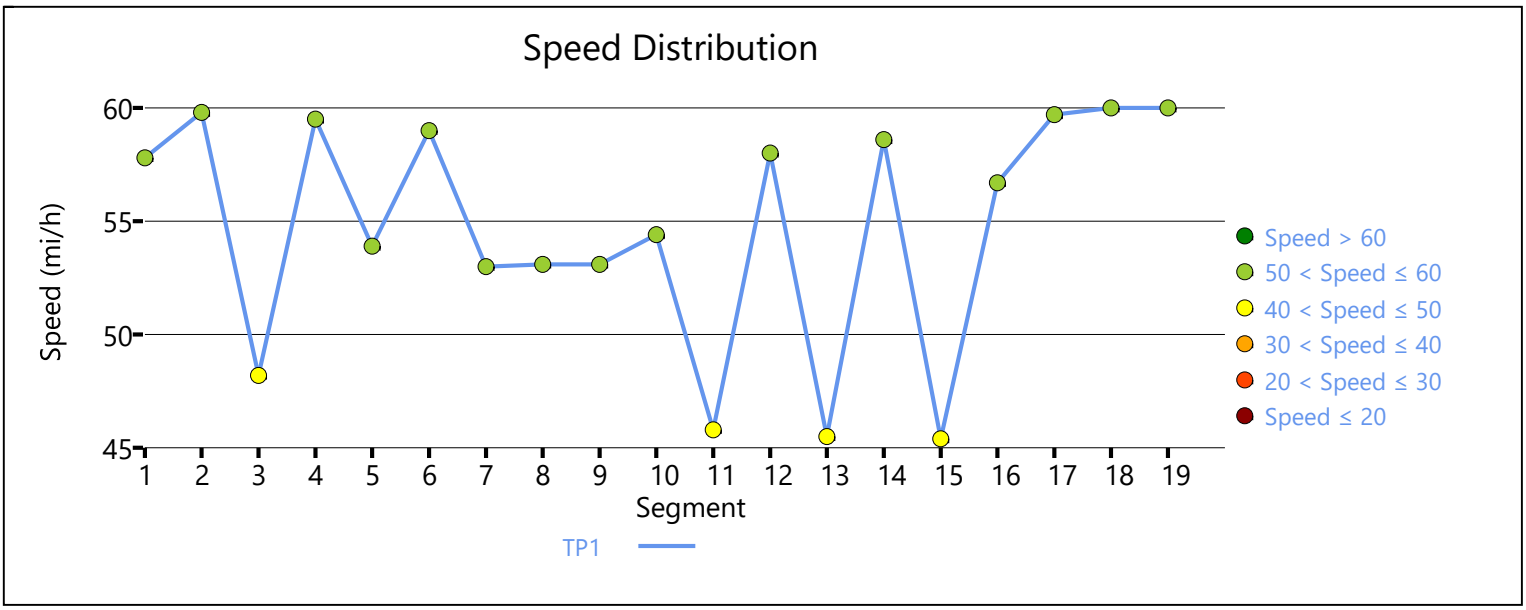
Facility Overall Results

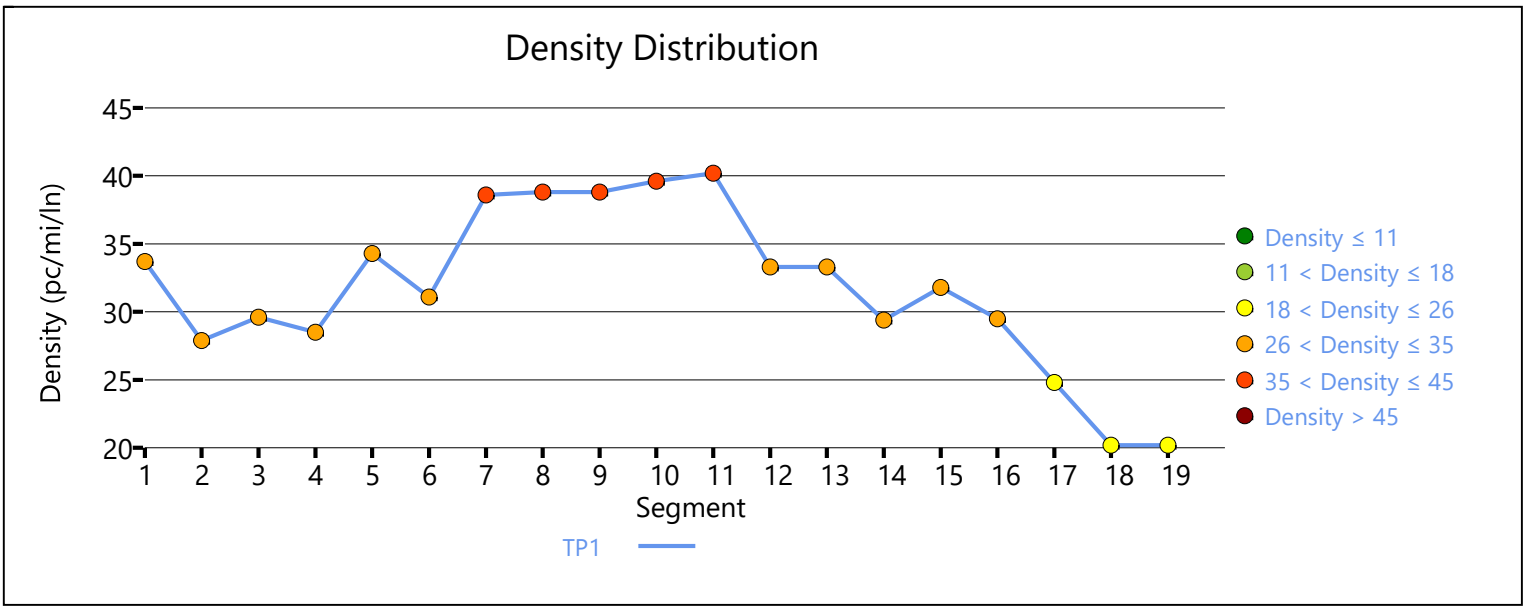
Space Mean Speed, mi/h	52.7	Density, veh/mi/ln	29.9
Average Travel Time, min	7.30	Density, pc/mi/ln	31.5

Messages

Comments







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HCS7 Basic Freeway Report

Project Information

Analyst	MEL	Date	5/18/2020
Agency	Burgess & Niple	Analysis Year	2045 Interim Build
Jurisdiction		Time Period Analyzed	AM Peak Northbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary
Segment Number	1	Segment Name	South of WB I-277 On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5340	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1950
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.85
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	57.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	33.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	2	Segment Name	WB I-277 On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1080	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5340	760
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	5851	840
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.73	0.40

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	59.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	27.9
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	27.9

HCS7 Freeway Weaving Report

Project Information

Segment Number	3	Segment Name	Waterloo On to Wilbreth Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1090	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.67	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5860	370	30	240
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	4.00	4.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.962	0.962	0.971
Flow Rate (v_i), pc/h	6420	409	33	263

Weaving Flow Rate (v_W), pc/h	672	Freeway Max Capacity (c_{IFL}), pc/h/ln	2300
Non-Weaving Flow Rate (v_{NW}), pc/h	6453	Density-Based Capacity (c_{IWL}), pc/h/ln	2117
Total Flow Rate (v), pc/h	7125	Demand Flow-Based Capacity (c_{IW}), pc/h	25532
Volume Ratio (VR)	0.094	Weaving Segment Capacity (c_W), veh/h	10272
Minimum Lane Change Rate (LC_{MIN}), lc/h	672	Adjusted Weaving Area Capacity, pc/h	10585
Maximum Weaving Length (L_{MAX}), ft	3481	Volume-to-Capacity Ratio (v/c)	0.67

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1172	Average Weaving Speed (S_W), mi/h	47.2
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	957	Average Non-Weaving Speed (S_{NW}), mi/h	48.3
Weaving Lane Change Rate (LC_W), lc/h	1273	Average Speed (S), mi/h	48.2
Weaving Lane Change Rate (LC_{All}), lc/h	2230	Density (D), pc/mi/ln	29.6
Weaving Intensity Factor (W)	0.398	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information			
Segment Number	4	Segment Name	South of Wilbreth On
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1880	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6230	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1706
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.74
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	28.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	5	Segment Name	Wilbreth On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6230	520
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	6826	575
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.80	0.27

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.373
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2048
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	53.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.146	Outer Lanes Freeway Speed (SO), mi/h	54.4
Flow in Lanes 1 and 2 (v12), pc/h	2730	Ramp Junction Speed (S), mi/h	53.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	3305	Average Density (D), pc/mi/ln	34.3
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	27.3

HCS7 Basic Freeway Report

Project Information			
Segment Number	6	Segment Name	South of Archwood On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1560	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6750	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1832
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.80
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	31.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	7	Segment Name	Archwood On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	500	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6750	780
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.971
Flow Rate (vi),pc/h	7327	855
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.89	0.41

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.448
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2198
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	51.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.111	Outer Lanes Freeway Speed (SO), mi/h	53.9
Flow in Lanes 1 and 2 (v12), pc/h	2931	Ramp Junction Speed (S), mi/h	53.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	3786	Average Density (D), pc/mi/ln	38.6
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	31.6

HCS7 Overlap Freeway Report

Project Information			
Segment Number	8	Segment Name	Archwood On to I-76 Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	54.2
Right-Side Lateral Clearance, ft	10		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	7530	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2044
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2242
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2242
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.91
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	53.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	38.8
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	54.2		

HCS7 Freeway Diverge Report

Project Information

Segment Number	9	Segment Name	I-76 Off-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	2
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	500	0
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7530	3560
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.952
Flow Rate (vi),pc/h	8250	3978
Capacity (c), pc/h	9200	4200
Volume-to-Capacity Ratio (v/c)	0.90	0.95

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.656
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1581
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	48.2
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.260	Outer Lanes Freeway Speed (SO), mi/h	63.6
Flow in Lanes 1 and 2 (v12), pc/h	5089	Ramp Junction Speed (S), mi/h	53.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	38.8
Level of Service (LOS)	E	Density in Ramp Influence Area (DR), pc/mi/ln	48.0

HCS7 Basic Freeway Report

Project Information			
Segment Number	10	Segment Name	South of I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	2840	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3970	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2155
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.94
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	54.4
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	39.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	11	Segment Name	I-76 On to Carroll Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1660	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3090	2200	550	880
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	4.00	4.00	4.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.962	0.962	0.962
Flow Rate (v_i), pc/h	3354	2433	608	973
Weaving Flow Rate (v_W), pc/h	3406	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	3962	Density-Based Capacity (c_{IWL}), pc/h/ln		1982
Total Flow Rate (v), pc/h	7368	Demand Flow-Based Capacity (c_{IW}), pc/h		7576
Volume Ratio (VR)	0.462	Weaving Segment Capacity (c_W), veh/h		7350
Minimum Lane Change Rate (LC_{MIN}), lc/h	973	Adjusted Weaving Area Capacity, pc/h		7576
Maximum Weaving Length (L_{MAX}), ft	5820	Volume-to-Capacity Ratio (v/c)		0.97

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1535	Average Weaving Speed (S_W), mi/h	47.8
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1534	Average Non-Weaving Speed (S_{NW}), mi/h	44.2
Weaving Lane Change Rate (LC_W), lc/h	1576	Average Speed (S), mi/h	45.8
Weaving Lane Change Rate (LC_{All}), lc/h	3110	Density (D), pc/mi/ln	40.2
Weaving Intensity Factor (W)	0.371	Level of Service (LOS)	E

HCS7 Basic Freeway Report

Project Information			
Segment Number	12	Segment Name	South of Butchel On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1640	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5290	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1932
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.84
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	58.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	33.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	13	Segment Name	Butchel On to Perkins Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	570	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4600	200	50	690
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	5.00	5.00	1.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.952	0.952	0.990
Flow Rate (v_i), pc/h	5040	223	56	741
Weaving Flow Rate (v_W), pc/h	964	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	5096	Density-Based Capacity (c_{IWL}), pc/h/ln		2028
Total Flow Rate (v), pc/h	6060	Demand Flow-Based Capacity (c_{IW}), pc/h		15094
Volume Ratio (VR)	0.159	Weaving Segment Capacity (c_W), veh/h		7889
Minimum Lane Change Rate (LC_{MIN}), lc/h	964	Adjusted Weaving Area Capacity, pc/h		8113
Maximum Weaving Length (L_{MAX}), ft	4121	Volume-to-Capacity Ratio (v/c)		0.75

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	629	Average Weaving Speed (S_W), mi/h	43.8
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	588	Average Non-Weaving Speed (S_{NW}), mi/h	45.8
Weaving Lane Change Rate (LC_W), lc/h	1222	Average Speed (S), mi/h	45.5
Weaving Lane Change Rate (LC_{All}), lc/h	1810	Density (D), pc/mi/ln	33.3
Weaving Intensity Factor (W)	0.562	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information			
Segment Number	14	Segment Name	South of Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1350	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4800	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1753
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.76
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	58.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	15	Segment Name	Perkins On to Glenwood Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	3200	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.67	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4130	400	50	670
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	3.00	3.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.971	0.971	0.943
Flow Rate (v_i), pc/h	4525	438	55	756
Weaving Flow Rate (v_W), pc/h	1194	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	4580	Density-Based Capacity (c_{IWL}), pc/h/ln		2192
Total Flow Rate (v), pc/h	5774	Demand Flow-Based Capacity (c_{IW}), pc/h		11594
Volume Ratio (VR)	0.207	Weaving Segment Capacity (c_W), veh/h		8482
Minimum Lane Change Rate (LC_{MIN}), lc/h	1194	Adjusted Weaving Area Capacity, pc/h		8768
Maximum Weaving Length (L_{MAX}), ft	4608	Volume-to-Capacity Ratio (v/c)		0.66

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	2443	Average Weaving Speed (S_W), mi/h	49.5
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2710	Average Non-Weaving Speed (S_{NW}), mi/h	44.5
Weaving Lane Change Rate (LC_W), lc/h	1930	Average Speed (S), mi/h	45.4
Weaving Lane Change Rate (LC_{All}), lc/h	4640	Density (D), pc/mi/ln	31.8
Weaving Intensity Factor (W)	0.303	Level of Service (LOS)	D

HCS7 Freeway Diverge Report

Project Information

Segment Number	16	Segment Name	Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1010	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4530	490
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.980
Flow Rate (vi),pc/h	5010	532
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.73	0.25

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.346
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1746
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	53.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.610	Outer Lanes Freeway Speed (SO), mi/h	62.9
Flow in Lanes 1 and 2 (v12), pc/h	3264	Ramp Junction Speed (S), mi/h	56.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	29.5
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	26.9

HCS7 Basic Freeway Report

Project Information			
Segment Number	17	Segment Name	South of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2010	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4040	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1489
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.65
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	24.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	18	Segment Name	Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4040	350
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.952
Flow Rate (vi),pc/h	4468	391
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.53	0.19

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	20.2
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	20.2

HCS7 Basic Freeway Report

Project Information

Segment Number	19	Segment Name	North of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4390	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1214
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.53
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	60.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	20.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

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I-77 Northbound

PM Interim Build

HCS Facilities and Segment Output

HCS7 Freeway Facilities Report

Project Information

Analyst	MEL	Date	5/18/2020
Agency	Burgess & Niple	Analysis Year	2045 Interim Build
Jurisdiction		Time Period Analyzed	PM Peak Northbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary

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	19
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	6.36		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	South of WB I-277 On-ramp	2000	3
2	Merge	Basic	WB I-277 On-ramp	1080	4
3	Weaving	Weaving	Waterloo On to Wilbreth Off	2090	5
4	Basic	Basic	South of Wilbreth On	1880	4
5	Merge	Merge	Wilbreth On-ramp	1500	4
6	Basic	Basic	South of Archwood On-Ramp	1560	4
7	Merge	Merge	Archwood On-ramp	500	4
8	Overlap	Overlap	Archwood On to I-76 Off	1000	4
9	Diverge	Diverge	I-76 Off-ramp	500	4
10	Basic	Basic	South of I-76 On-Ramp	2840	2
11	Weaving	Weaving	I-76 On to Carroll Off	3370	4
12	Basic	Basic	South of Butchel On-Ramp	1640	3
13	Weaving	Weaving	Butchel On to Perkins Off	1570	4
14	Basic	Basic	South of Perkins On-Ramp	1350	3
15	Weaving	Weaving	South of Glenwood Off-Ramp	4200	4
16	Diverge	Diverge	Tallmadge Off-Ramp	1010	3
17	Basic	Basic	South of Tallmadge On-Ramp	2010	3
18	Merge	Basic	Tallmadge On-Ramp	1500	4
19	Basic	Basic	North of Tallmadge On-Ramp	2000	4

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	5254	6900	0.76	59.6	29.4	D

Segment 2: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.952	5746	492	9200	2100	0.62	0.23	60.0	60.0	23.9	23.9	C

Segment 3: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6253	10426	0.60	47.7	26.2	C

Segment 4: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	5786	9200	0.63	59.5	24.1	C

Segment 5: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.980	6285	499	9200	2100	0.68	0.24	54.9	54.0	28.6	23.5	C

Segment 6: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6285	9200	0.68	59.6	26.2	D

Segment 7: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.990	6865	580	9200	2100	0.75	0.28	54.3	53.5	31.6	26.3	C

Segment 8: Overlap

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6871	8968	0.77	54.7	31.7	D

Segment 9: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.943	6935	3102	9200	4200	0.75	0.74	54.7	49.6	31.7	39.5	E

Segment 10: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	3886	4600	0.84	57.9	33.6	D

Segment 11: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6415	8096	0.79	49.2	32.6	D

Segment 12: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	5601	6714	0.83	53.7	34.7	D

Segment 13: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6372	8112	0.79	44.8	35.6	E

Segment 14: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6057	6900	0.88	56.8	35.5	E

Segment 15: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	7449	8800	0.85	43.5	42.8	E

Segment 16: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.980	6817	391	6900	2100	0.99	0.19	55.9	54.0	40.6	34.3	D

Segment 17: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6426	6900	0.93	54.7	39.2	E

Segment 18: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.952	7074	648	9200	2100	0.77	0.31	59.5	59.5	29.7	29.7	D

Segment 19: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	7056	9200	0.77	59.5	29.6	D

Facility Time Period Results

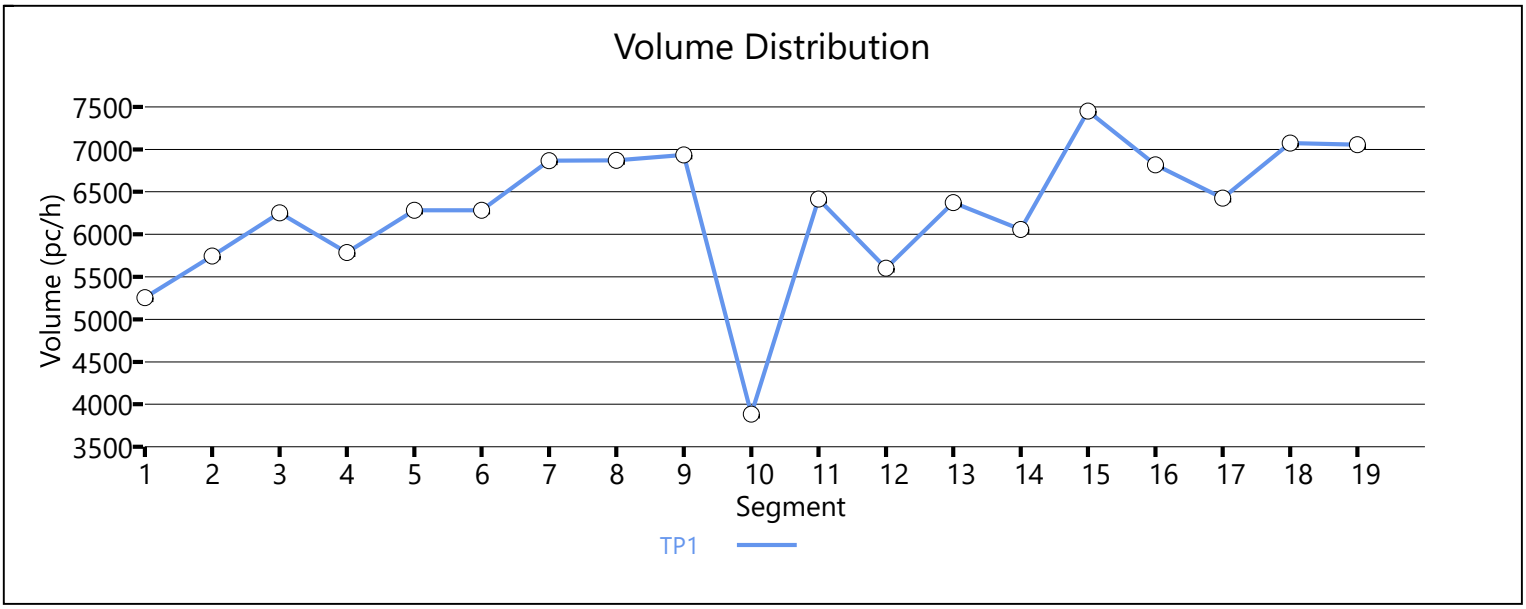
T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	52.5	32.5	31.0	7.30	D

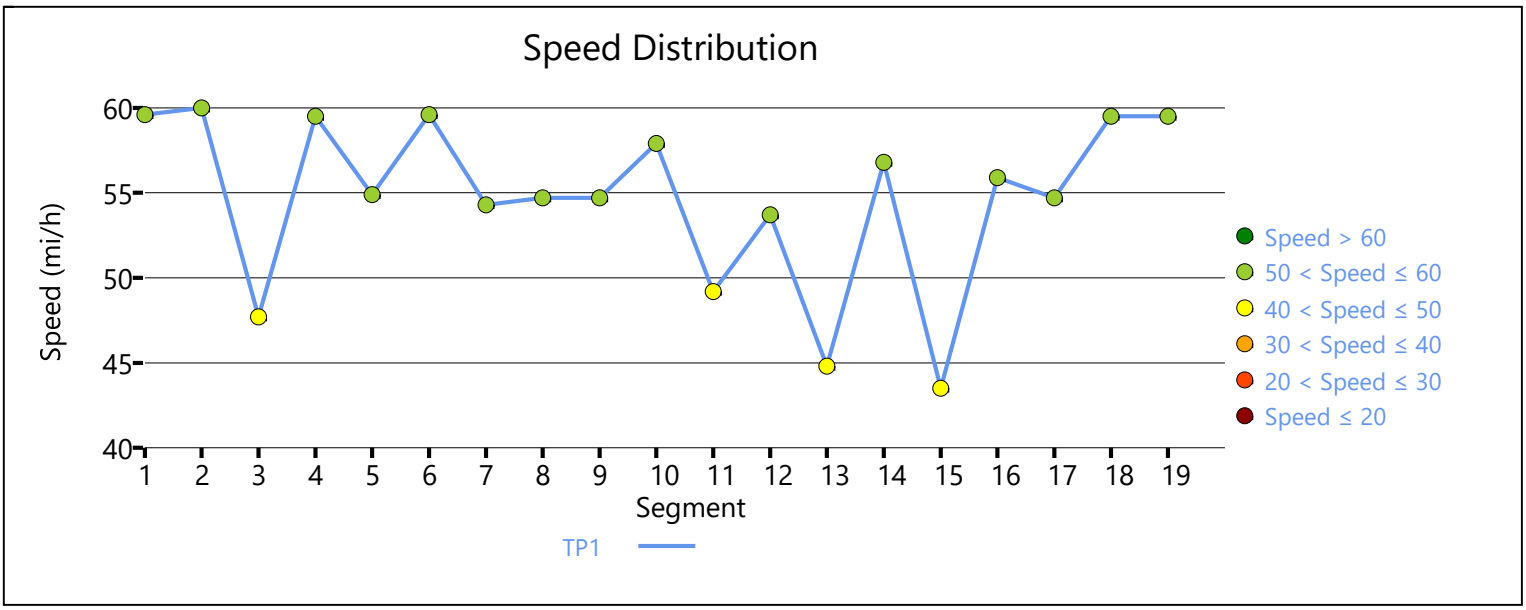
Facility Overall Results

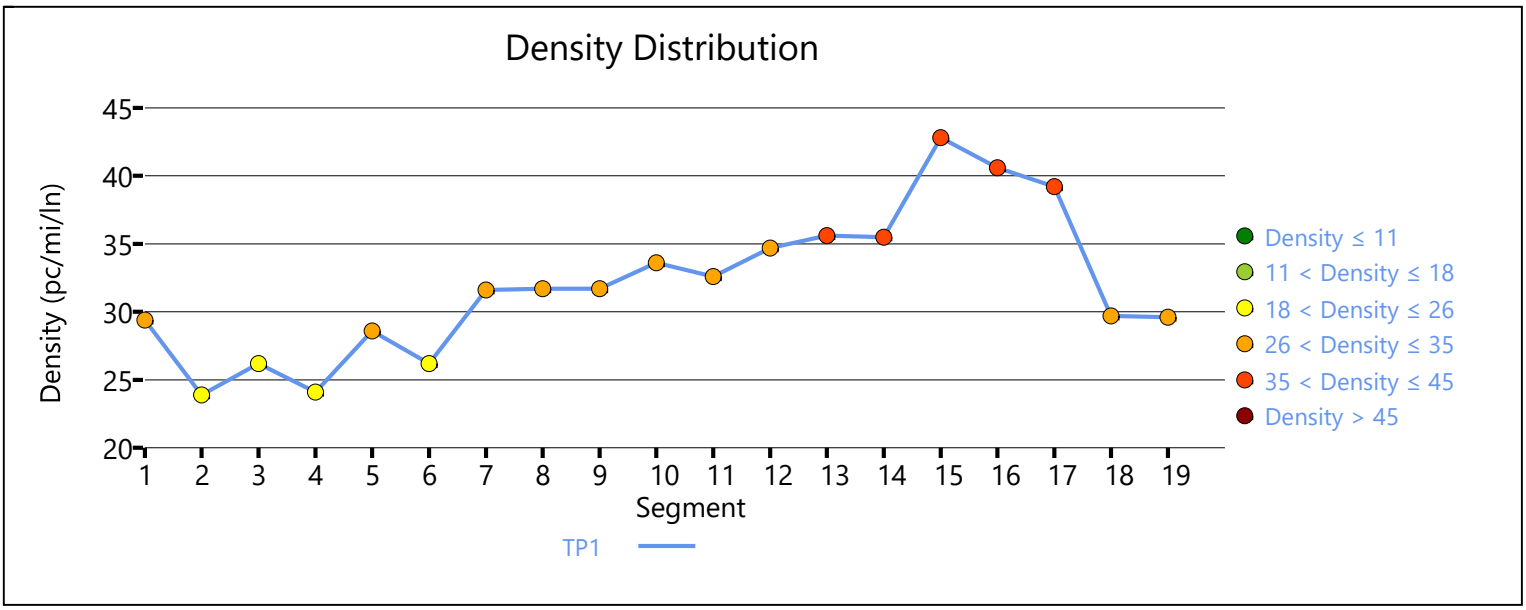
Space Mean Speed, mi/h	52.5	Density, veh/mi/ln	31.0
Average Travel Time, min	7.30	Density, pc/mi/ln	32.5

Messages

Comments







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HCS7 Basic Freeway Report

Project Information			
Analyst	MEL	Date	5/18/2020
Agency	Burgess & Niple	Analysis Year	2045 Interim Build
Jurisdiction		Time Period Analyzed	PM Peak Northbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary
Segment Number	1	Segment Name	South of WB I-277 On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity			
Demand Volume veh/h	4840	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1751
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.76
Passenger Car Equivalent (E_T)	2.000		

Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	2	Segment Name	WB I-277 On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1080	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4840	440
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.952
Flow Rate (vi),pc/h	5254	492
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.62	0.23

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	23.9
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	23.9

HCS7 Freeway Weaving Report

Project Information

Segment Number	3	Segment Name	Waterloo On to Wilbreth Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1090	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.67	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4910	420	60	370
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.980	0.980	0.980
Flow Rate (v_i), pc/h	5330	456	65	402
Weaving Flow Rate (v_W), pc/h	858	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	5395	Density-Based Capacity (c_{IWL}), pc/h/ln		2085
Total Flow Rate (v), pc/h	6253	Demand Flow-Based Capacity (c_{IW}), pc/h		17518
Volume Ratio (VR)	0.137	Weaving Segment Capacity (c_W), veh/h		10217
Minimum Lane Change Rate (LC_{MIN}), lc/h	858	Adjusted Weaving Area Capacity, pc/h		10426
Maximum Weaving Length (L_{MAX}), ft	3902	Volume-to-Capacity Ratio (v/c)		0.60

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	980	Average Weaving Speed (S_W), mi/h	47.3
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	739	Average Non-Weaving Speed (S_{NW}), mi/h	47.8
Weaving Lane Change Rate (LC_W), lc/h	1459	Average Speed (S), mi/h	47.7
Weaving Lane Change Rate (LC_{All}), lc/h	2198	Density (D), pc/mi/ln	26.2
Weaving Intensity Factor (W)	0.393	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information			
Segment Number	4	Segment Name	South of Wilbreth On
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1880	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5330	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1446
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.63
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	24.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	5	Segment Name	Wilbreth On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5330	460
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.980
Flow Rate (vi),pc/h	5786	499
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.68	0.24

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.332
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1736
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	54.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.155	Outer Lanes Freeway Speed (SO), mi/h	55.6
Flow in Lanes 1 and 2 (v12), pc/h	2314	Ramp Junction Speed (S), mi/h	54.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	2813	Average Density (D), pc/mi/ln	28.6
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	23.5

HCS7 Basic Freeway Report

Project Information			
Segment Number	6	Segment Name	South of Archwood On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1560	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5790	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1571
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.68
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	26.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	7	Segment Name	Archwood On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	500	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5790	540
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.990
Flow Rate (vi),pc/h	6285	580
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.75	0.28

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.362
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1886
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	53.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.145	Outer Lanes Freeway Speed (SO), mi/h	55.0
Flow in Lanes 1 and 2 (v12), pc/h	2514	Ramp Junction Speed (S), mi/h	54.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	3094	Average Density (D), pc/mi/ln	31.6
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	26.3

HCS7 Overlap Freeway Report

Project Information			
Segment Number	8	Segment Name	Archwood On to I-76 Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	54.2
Right-Side Lateral Clearance, ft	10		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6330	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1718
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2242
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2242
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.77
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	54.7
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	31.7
Total Ramp Density Adjustment	5.8	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	54.2		

HCS7 Freeway Diverge Report

Project Information

Segment Number	9	Segment Name	I-76 Off-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	2
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	500	0
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6330	2750
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.943
Flow Rate (vi),pc/h	6935	3102
Capacity (c), pc/h	9200	4200
Volume-to-Capacity Ratio (v/c)	0.75	0.74

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.577
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1418
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	49.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.260	Outer Lanes Freeway Speed (SO), mi/h	64.2
Flow in Lanes 1 and 2 (v12), pc/h	4099	Ramp Junction Speed (S), mi/h	54.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	31.7
Level of Service (LOS)	E	Density in Ramp Influence Area (DR), pc/mi/ln	39.5

HCS7 Basic Freeway Report

Project Information			
Segment Number	10	Segment Name	South of I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	2	Terrain Type	Level
Segment Length (L), ft	2840	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3580	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1943
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.84
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	57.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	33.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	11	Segment Name	I-76 On to Carroll Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1660	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3150	2010	320	430
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.980	0.980	0.980
Flow Rate (v_i), pc/h	3419	2182	347	467
Weaving Flow Rate (v_W), pc/h	2649	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	3766	Density-Based Capacity (c_{IWL}), pc/h/ln		2024
Total Flow Rate (v), pc/h	6415	Demand Flow-Based Capacity (c_{IW}), pc/h		8475
Volume Ratio (VR)	0.413	Weaving Segment Capacity (c_W), veh/h		7934
Minimum Lane Change Rate (LC_{MIN}), lc/h	467	Adjusted Weaving Area Capacity, pc/h		8096
Maximum Weaving Length (L_{MAX}), ft	5261	Volume-to-Capacity Ratio (v/c)		0.79

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1459	Average Weaving Speed (S_W), mi/h	49.6
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1302	Average Non-Weaving Speed (S_{NW}), mi/h	48.9
Weaving Lane Change Rate (LC_W), lc/h	1070	Average Speed (S), mi/h	49.2
Weaving Lane Change Rate (LC_{All}), lc/h	2372	Density (D), pc/mi/ln	32.6
Weaving Intensity Factor (W)	0.300	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information			
Segment Number	12	Segment Name	South of Butchel On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1640	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	53.8
Right-Side Lateral Clearance, ft	10		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5160	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1867
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2238
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2238
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.83
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	53.7
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	34.7
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	53.8		

HCS7 Freeway Weaving Report

Project Information

Segment Number	13	Segment Name	Butchel On to Perkins Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	570	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4900	680	40	260
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	1.00	1.00	1.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.990	0.990	0.990
Flow Rate (v_i), pc/h	5319	731	43	279
Weaving Flow Rate (v_W), pc/h	1010	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	5362	Density-Based Capacity (c_{IWL}), pc/h/ln		2028
Total Flow Rate (v), pc/h	6372	Demand Flow-Based Capacity (c_{IW}), pc/h		15094
Volume Ratio (VR)	0.159	Weaving Segment Capacity (c_W), veh/h		7963
Minimum Lane Change Rate (LC_{MIN}), lc/h	1010	Adjusted Weaving Area Capacity, pc/h		8112
Maximum Weaving Length (L_{MAX}), ft	4121	Volume-to-Capacity Ratio (v/c)		0.79

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	662	Average Weaving Speed (S_W), mi/h	43.4
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	643	Average Non-Weaving Speed (S_{NW}), mi/h	45.1
Weaving Lane Change Rate (LC_W), lc/h	1268	Average Speed (S), mi/h	44.8
Weaving Lane Change Rate (LC_{All}), lc/h	1911	Density (D), pc/mi/ln	35.6
Weaving Intensity Factor (W)	0.587	Level of Service (LOS)	E

HCS7 Basic Freeway Report

Project Information			
Segment Number	14	Segment Name	South of Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1350	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5580	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2019
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.88
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	56.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	35.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	15	Segment Name	South of Glenwood Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	3200	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.67	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5090	1190	110	490
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	1.00	1.00	1.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.990	0.990	0.990
Flow Rate (v_i), pc/h	5525	1279	118	527
Weaving Flow Rate (v_W), pc/h	1806	Freeway Max Capacity (c_{IFL}), pc/h/ln		2335
Non-Weaving Flow Rate (v_{NW}), pc/h	5643	Density-Based Capacity (c_{IWL}), pc/h/ln		2200
Total Flow Rate (v), pc/h	7449	Demand Flow-Based Capacity (c_{IW}), pc/h		9917
Volume Ratio (VR)	0.242	Weaving Segment Capacity (c_W), veh/h		8647
Minimum Lane Change Rate (LC_{MIN}), lc/h	1806	Adjusted Weaving Area Capacity, pc/h		8800
Maximum Weaving Length (L_{MAX}), ft	4970	Volume-to-Capacity Ratio (v/c)		0.85

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	3010	Average Weaving Speed (S_W), mi/h	51.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2947	Average Non-Weaving Speed (S_{NW}), mi/h	41.6
Weaving Lane Change Rate (LC_W), lc/h	2542	Average Speed (S), mi/h	43.5
Weaving Lane Change Rate (LC_{All}), lc/h	5489	Density (D), pc/mi/ln	42.8
Weaving Intensity Factor (W)	0.346	Level of Service (LOS)	E

HCS7 Freeway Diverge Report

Project Information

Segment Number	16	Segment Name	Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1010	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6280	360
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.980
Flow Rate (vi),pc/h	6817	391
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.99	0.19

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.333
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2700
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.572	Outer Lanes Freeway Speed (SO), mi/h	59.2
Flow in Lanes 1 and 2 (v12), pc/h	4117	Ramp Junction Speed (S), mi/h	55.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	40.6
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	34.3

HCS7 Basic Freeway Report

Project Information			
Segment Number	17	Segment Name	South of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2010	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5920	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2142
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.93
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	54.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	39.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	18	Segment Name	Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5920	580
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.952
Flow Rate (vi),pc/h	6426	648
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.77	0.31

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	59.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	29.7
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	29.7

HCS7 Basic Freeway Report

Project Information

Segment Number	19	Segment Name	North of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6500	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1764
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.77
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

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I-77 Southbound

AM Interim Build

HCS Facilities and Segment Output

HCS7 Freeway Facilities Report

Project Information

Analyst	MEL	Date	5/14/2020
Agency	Burgess & Niple	Analysis Year	2045 Interim Build
Jurisdiction		Time Period Analyzed	AM Peak Southbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary

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	18
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	6.31		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	North of Tallmadge Off-Ramp	2000	4
2	Diverge	Basic	Tallmadge Off-Ramp	1500	4
3	Basic	Basic	North of Tallmadge On-Ramp	1620	3
4	Merge	Merge	Tallmadge On-Ramp	1090	3
5	Weaving	Weaving	Glenwood On to Perkins Off	4680	4
6	Basic	Basic	North of Perkins On-Ramp	1300	3
7	Weaving	Weaving	Perkins On to Butchel Off	1460	4
8	Basic	Basic	North of Carroll On-Ramp	1630	3
9	Weaving	Weaving	Carroll On to I-76 Off	3660	4
10	Basic	Basic	North of EB I-76 On-Ramp	2070	3
11	Merge	Basic	EB I-76 On-Ramp	130	4
12	Weaving	Weaving	I-76 On to Archwood Off	3180	5
13	Basic	Basic	North of Wilbreth Off-Ramp	690	4
14	Diverge	Diverge	Wilbreth Off-Ramp	1500	4
15	Basic	Basic	North of Wilbreth On-ramp	1430	4
16	Weaving	Weaving	Wilbreth on to Waterloo off	2840	5
17	Diverge	Basic	277 WB Off-Ramp	540	4
18	Basic	Basic	South of 277 WB Off-Ramp	2000	3

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	6657	9200	0.72	59.9	27.8	D

Segment 2: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.943	6657	575	9200	2100	0.72	0.27	59.9	59.9	27.8	27.8	D

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	6093	6900	0.88	56.6	35.9	E

Segment 4: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.917	6592	499	6900	2100	0.96	0.24	51.6	51.0	42.6	32.9	D

Segment 5: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	6987	8716	0.80	41.1	42.5	E

Segment 6: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	5464	6900	0.79	59.1	30.8	D

Segment 7: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	5796	7972	0.73	44.3	32.7	D

Segment 8: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	4962	6900	0.72	58.7	27.6	D

Segment 9: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	5533	7692	0.72	50.2	27.6	C

Segment 10: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	3218	6900	0.47	59.9	17.9	B

Segment 11: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.952	0.935	4208	990	9200	2100	0.46	0.47	60.0	60.0	17.5	17.5	B

Segment 12: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	5663	7668	0.74	41.0	27.6	C

Segment 13: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.935	5279	9200	0.57	59.2	22.0	C

Segment 14: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.935	0.962	5279	343	9200	2100	0.57	0.16	59.0	54.1	22.4	20.7	C

Segment 15: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.935	4927	9200	0.54	59.9	20.5	C

Segment 16: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.935	5375	10740	0.50	49.6	21.7	C

Segment 17: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.935	0.935	5018	922	9200	2100	0.55	0.44	59.3	60.0	20.9	20.9	C

Segment 18: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.935	4096	6900	0.59	59.9	22.8	C

Facility Time Period Results

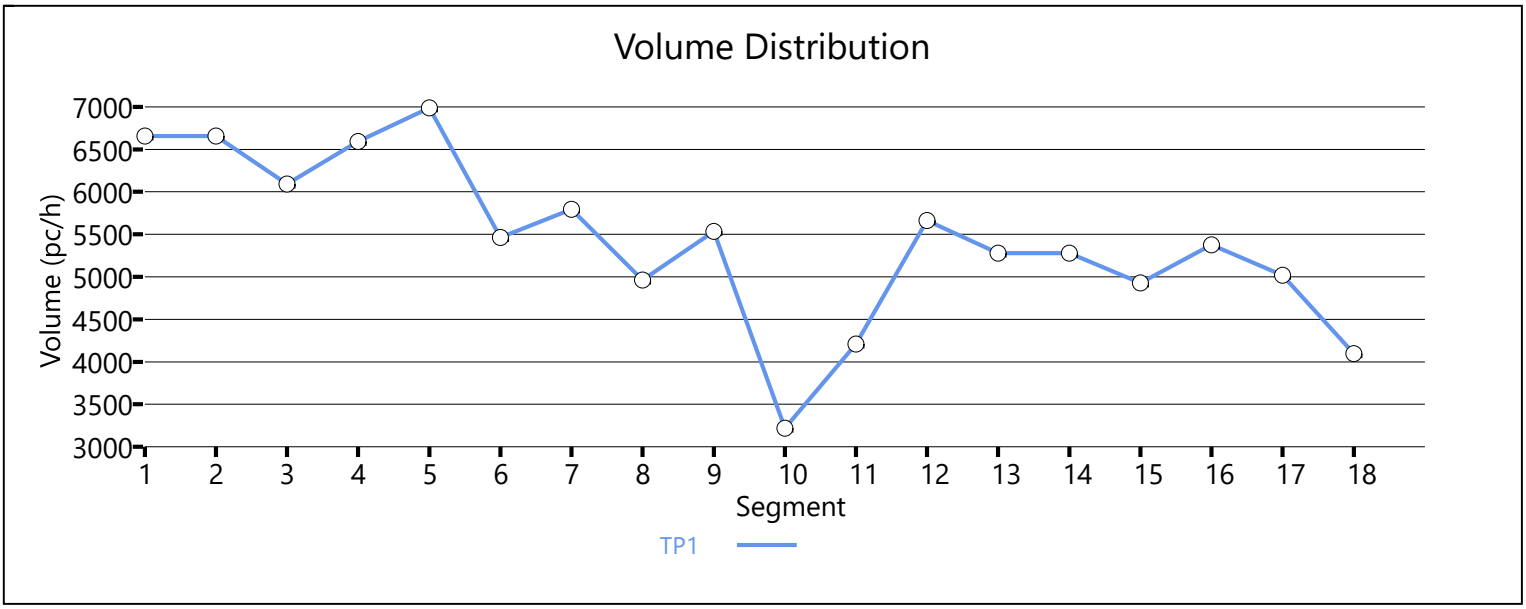
T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	50.3	28.6	26.3	7.50	D

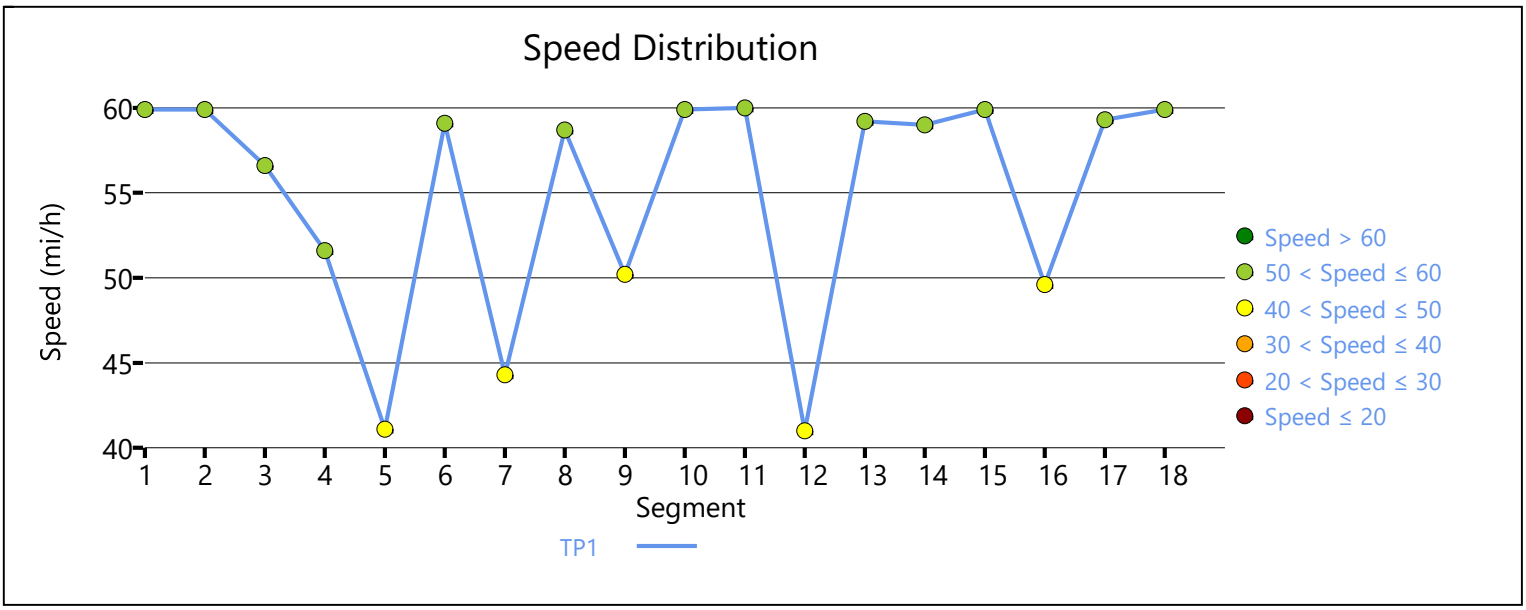
Facility Overall Results

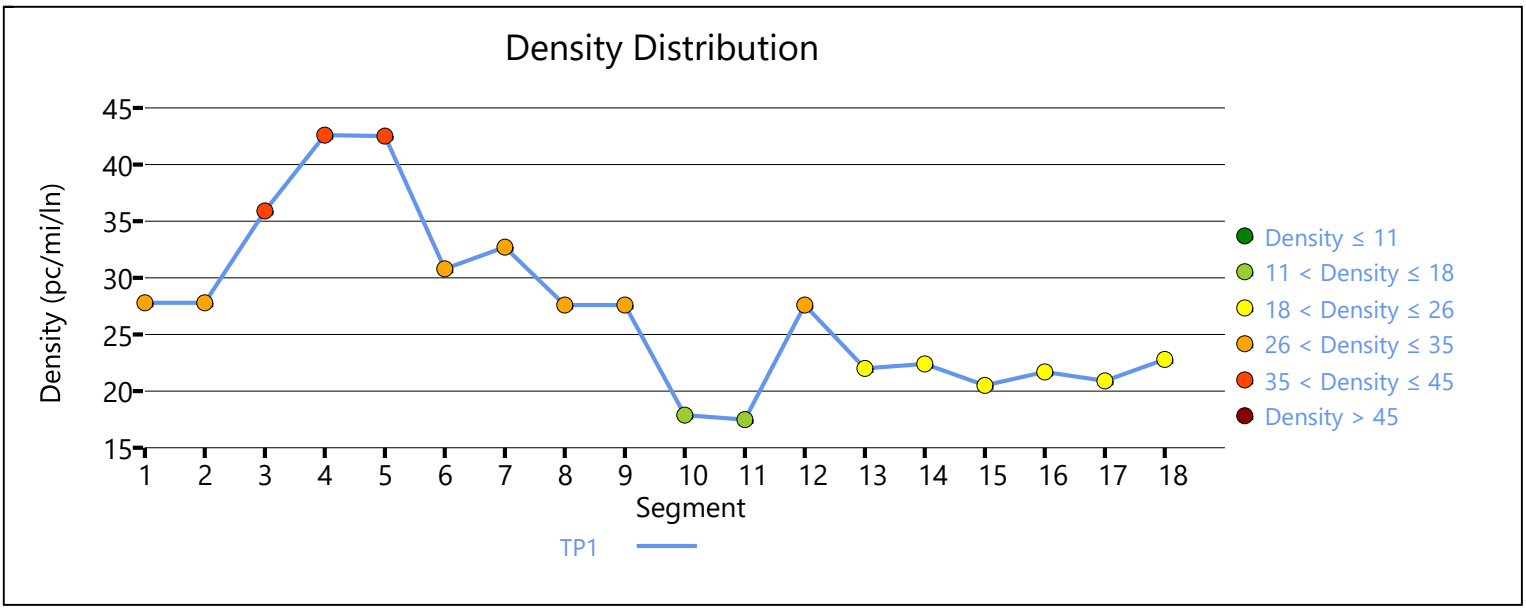
Space Mean Speed, mi/h	50.3	Density, veh/mi/ln	26.3
Average Travel Time, min	7.50	Density, pc/mi/ln	28.6

Messages

Comments







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HCS7 Basic Freeway Report

Project Information

Analyst	MEL	Date	5/14/2020
Agency	Burgess & Niple	Analysis Year	2045 Interim Build
Jurisdiction		Time Period Analyzed	AM Peak Southbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary
Segment Number	1	Segment Name	North of Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6020	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1664
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	27.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	2	Segment Name	Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6020	510
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.943
Flow Rate (vi),pc/h	6657	575
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.72	0.27

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	59.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	27.8
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	27.8

HCS7 Basic Freeway Report

Project Information			
Segment Number	3	Segment Name	North of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1620	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5510	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2031
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.88
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	56.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	35.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	4	Segment Name	Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1090	770
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5510	430
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	9.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.917
Flow Rate (vi),pc/h	6093	499
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.96	0.24

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.499
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2443
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	51.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.599	Outer Lanes Freeway Speed (SO), mi/h	52.6
Flow in Lanes 1 and 2 (v12), pc/h	3650	Ramp Junction Speed (S), mi/h	51.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	4149	Average Density (D), pc/mi/ln	42.6
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	32.9

HCS7 Freeway Weaving Report

Project Information

Segment Number	5	Segment Name	Glenwood On to Perkins Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	3520	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.83	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4610	280	100	1330
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	4.00	10.00	10.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.962	0.909	0.909	0.980
Flow Rate (v_i), pc/h	5098	328	117	1444
Weaving Flow Rate (v_W), pc/h	1772	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	5215	Density-Based Capacity (c_{IWL}), pc/h/ln		2179
Total Flow Rate (v), pc/h	6987	Demand Flow-Based Capacity (c_{IW}), pc/h		9449
Volume Ratio (VR)	0.254	Weaving Segment Capacity (c_W), veh/h		8388
Minimum Lane Change Rate (LC_{MIN}), lc/h	1772	Adjusted Weaving Area Capacity, pc/h		8716
Maximum Weaving Length (L_{MAX}), ft	5096	Volume-to-Capacity Ratio (v/c)		0.80

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	3365	Average Weaving Speed (S_W), mi/h	49.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2852	Average Non-Weaving Speed (S_{NW}), mi/h	38.9
Weaving Lane Change Rate (LC_W), lc/h	2587	Average Speed (S), mi/h	41.1
Weaving Lane Change Rate (LC_{All}), lc/h	5439	Density (D), pc/mi/ln	42.5
Weaving Intensity Factor (W)	0.319	Level of Service (LOS)	E

HCS7 Basic Freeway Report

Project Information			
Segment Number	6	Segment Name	North of Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1300	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4890	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1821
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.79
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	30.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	7	Segment Name	Perkins On to Butchel Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	460	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4150	290	30	740
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	2.00	2.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.952	0.980	0.980	0.971
Flow Rate (v_i), pc/h	4637	315	33	811

Weaving Flow Rate (v_W), pc/h	1126	Freeway Max Capacity (c_{IFL}), pc/h/ln	2300
Non-Weaving Flow Rate (v_{NW}), pc/h	4670	Density-Based Capacity (c_{IWL}), pc/h/ln	1993
Total Flow Rate (v), pc/h	5796	Demand Flow-Based Capacity (c_{IW}), pc/h	12371
Volume Ratio (VR)	0.194	Weaving Segment Capacity (c_W), veh/h	7624
Minimum Lane Change Rate (LC_{MIN}), lc/h	1126	Adjusted Weaving Area Capacity, pc/h	7972
Maximum Weaving Length (L_{MAX}), ft	4475	Volume-to-Capacity Ratio (v/c)	0.73

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	501	Average Weaving Speed (S_W), mi/h	42.2
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	441	Average Non-Weaving Speed (S_{NW}), mi/h	44.9
Weaving Lane Change Rate (LC_W), lc/h	1333	Average Speed (S), mi/h	44.3
Weaving Lane Change Rate (LC_{All}), lc/h	1774	Density (D), pc/mi/ln	32.7
Weaving Intensity Factor (W)	0.656	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information			
Segment Number	8	Segment Name	North of Carroll On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1630	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4440	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1654
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	58.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	27.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	9	Segment Name	Carroll On to I-76 Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	2660	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2510	370	190	1930
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	3.00	3.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.952	0.971	0.971	0.971
Flow Rate (v_i), pc/h	2805	405	208	2115
Weaving Flow Rate (v_W), pc/h	2520	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	3013	Density-Based Capacity (c_{IWL}), pc/h/ln		2064
Total Flow Rate (v), pc/h	5533	Demand Flow-Based Capacity (c_{IW}), pc/h		7692
Volume Ratio (VR)	0.455	Weaving Segment Capacity (c_W), veh/h		7395
Minimum Lane Change Rate (LC_{MIN}), lc/h	405	Adjusted Weaving Area Capacity, pc/h		7692
Maximum Weaving Length (L_{MAX}), ft	5739	Volume-to-Capacity Ratio (v/c)		0.72

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	2004	Average Weaving Speed (S_W), mi/h	50.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2361	Average Non-Weaving Speed (S_{NW}), mi/h	50.4
Weaving Lane Change Rate (LC_W), lc/h	1231	Average Speed (S), mi/h	50.2
Weaving Lane Change Rate (LC_{All}), lc/h	3592	Density (D), pc/mi/ln	27.6
Weaving Intensity Factor (W)	0.286	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information			
Segment Number	10	Segment Name	North of EB I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2070	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	2880	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1073
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.47
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	17.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	11	Segment Name	EB I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	130	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2880	870
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.935
Flow Rate (vi),pc/h	3218	990
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.46	0.47

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	17.5
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.5

HCS7 Freeway Weaving Report

Project Information

Segment Number	12	Segment Name	I-76 On to Archwood Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1780	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3410	1230	70	340
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	7.00	7.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.952	0.935	0.935	0.971
Flow Rate (v_i), pc/h	3811	1399	80	373
Weaving Flow Rate (v_W), pc/h	1772	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	3891	Density-Based Capacity (c_{IWL}), pc/h/ln		1998
Total Flow Rate (v), pc/h	5663	Demand Flow-Based Capacity (c_{IW}), pc/h		7668
Volume Ratio (VR)	0.313	Weaving Segment Capacity (c_W), veh/h		7275
Minimum Lane Change Rate (LC_{MIN}), lc/h	2145	Adjusted Weaving Area Capacity, pc/h		7668
Maximum Weaving Length (L_{MAX}), ft	5724	Volume-to-Capacity Ratio (v/c)		0.74

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1501	Average Weaving Speed (S_W), mi/h	45.7
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1346	Average Non-Weaving Speed (S_{NW}), mi/h	39.1
Weaving Lane Change Rate (LC_W), lc/h	3088	Average Speed (S), mi/h	41.0
Weaving Lane Change Rate (LC_{All}), lc/h	4434	Density (D), pc/mi/ln	27.6
Weaving Intensity Factor (W)	0.464	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information			
Segment Number	13	Segment Name	North of Wilbreth Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	690	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4640	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1320
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.57
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Diverge Report

Project Information

Segment Number	14	Segment Name	Wilbreth Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	560
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4640	310
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	7.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.935	0.962
Flow Rate (vi),pc/h	5279	343
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.57	0.16

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.329
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1392
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	64.3
Flow in Lanes 1 and 2 (v12), pc/h	2495	Ramp Junction Speed (S), mi/h	59.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	22.4
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	20.7

HCS7 Basic Freeway Report

Project Information			
Segment Number	15	Segment Name	North of Wilbreth On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1430	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4330	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1232
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.54
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	20.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	16	Segment Name	Wilbreth on to Waterloo off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1840	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.83	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4050	360	60	280
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	7.00	3.00	3.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.935	0.971	0.971	0.971
Flow Rate (v_i), pc/h	4608	394	66	307
Weaving Flow Rate (v_W), pc/h	701	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	4674	Density-Based Capacity (c_{IWL}), pc/h/ln		2148
Total Flow Rate (v), pc/h	5375	Demand Flow-Based Capacity (c_{IW}), pc/h		18462
Volume Ratio (VR)	0.130	Weaving Segment Capacity (c_W), veh/h		10097
Minimum Lane Change Rate (LC_{MIN}), lc/h	701	Adjusted Weaving Area Capacity, pc/h		10740
Maximum Weaving Length (L_{MAX}), ft	3833	Volume-to-Capacity Ratio (v/c)		0.50

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1577	Average Weaving Speed (S_W), mi/h	48.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1736	Average Non-Weaving Speed (S_{NW}), mi/h	49.8
Weaving Lane Change Rate (LC_W), lc/h	1581	Average Speed (S), mi/h	49.6
Weaving Lane Change Rate (LC_{All}), lc/h	3317	Density (D), pc/mi/ln	21.7
Weaving Intensity Factor (W)	0.360	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information

Segment Number	17	Segment Name	277 WB Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	540	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4410	810
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	7.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.935	0.935
Flow Rate (vi),pc/h	5018	922
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.55	0.44

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	20.9
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	20.9

HCS7 Basic Freeway Report

Project Information

Segment Number	18	Segment Name	South of 277 WB Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3600	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1365
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.59
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

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I-77 Southbound

PM Interim Build

HCS Facilities and Segment Output

HCS7 Freeway Facilities Report

Project Information

Analyst	MEL	Date	5/14/2020
Agency	Burgess & Niple	Analysis Year	2045 Interim Build
Jurisdiction		Time Period Analyzed	PM Peak Southbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary

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	18
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	6.31		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	North of Tallmadge Off-Ramp	2000	4
2	Diverge	Basic	Tallmadge Off-Ramp	1500	4
3	Basic	Basic	North of Tallmadge On-Ramp	1620	3
4	Merge	Merge	Tallmadge On-Ramp	1090	3
5	Weaving	Weaving	Glenwood On to Perkins Off	4680	4
6	Basic	Basic	North of Perkins On-Ramp	1300	3
7	Weaving	Weaving	Perkins On to Butchel Off	1460	4
8	Basic	Basic	North of Carroll On-Ramp	1630	3
9	Weaving	Weaving	Carroll On to I-76 Off	3660	4
10	Basic	Basic	North of EB I-76 On-Ramp	2070	3
11	Merge	Basic	EB I-76 On-Ramp	130	4
12	Weaving	Weaving	I-76 On to Archwood Off	3180	5
13	Basic	Basic	North of Wilbreth Off-Ramp	690	4
14	Diverge	Diverge	Wilbreth Off-Ramp	1500	4
15	Basic	Basic	North of Wilbreth On-ramp	1430	4
16	Weaving	Weaving	Wilbreth on to Waterloo off	2840	5
17	Diverge	Basic	277 WB Off-Ramp	540	4
18	Basic	Basic	South of 277 WB Off-Ramp	2000	3

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5347	9200	0.58	60.0	22.3	C

Segment 2: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.962	5347	719	9200	2100	0.58	0.34	60.0	60.0	22.3	22.3	C

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	4634	6900	0.67	60.0	25.8	C

Segment 4: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.980	5122	488	6900	2100	0.74	0.23	54.1	53.6	31.6	26.0	C

Segment 5: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5591	9088	0.62	48.1	29.1	D

Segment 6: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5149	6900	0.75	59.8	28.7	D

Segment 7: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5859	7912	0.74	43.5	33.7	D

Segment 8: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5204	6900	0.75	58.6	29.1	D

Segment 9: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	6453	8460	0.76	47.0	34.3	D

Segment 10: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	4437	6900	0.64	59.9	24.6	C

Segment 11: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.962	6118	1681	9200	2100	0.67	0.80	60.0	60.0	25.5	25.5	C

Segment 12: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	7581	10330	0.73	38.9	39.0	E

Segment 13: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	7154	9200	0.78	59.1	30.1	D

Segment 14: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.962	7154	409	9200	2100	0.78	0.19	58.1	54.0	30.8	28.0	C

Segment 15: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	6749	9200	0.73	59.8	28.2	D

Segment 16: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	7463	10775	0.69	46.3	32.2	D

Segment 17: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.943	7067	1342	9200	2100	0.77	0.64	59.1	59.5	29.7	29.7	D

Segment 18: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5763	6900	0.84	58.1	33.1	D

Facility Time Period Results

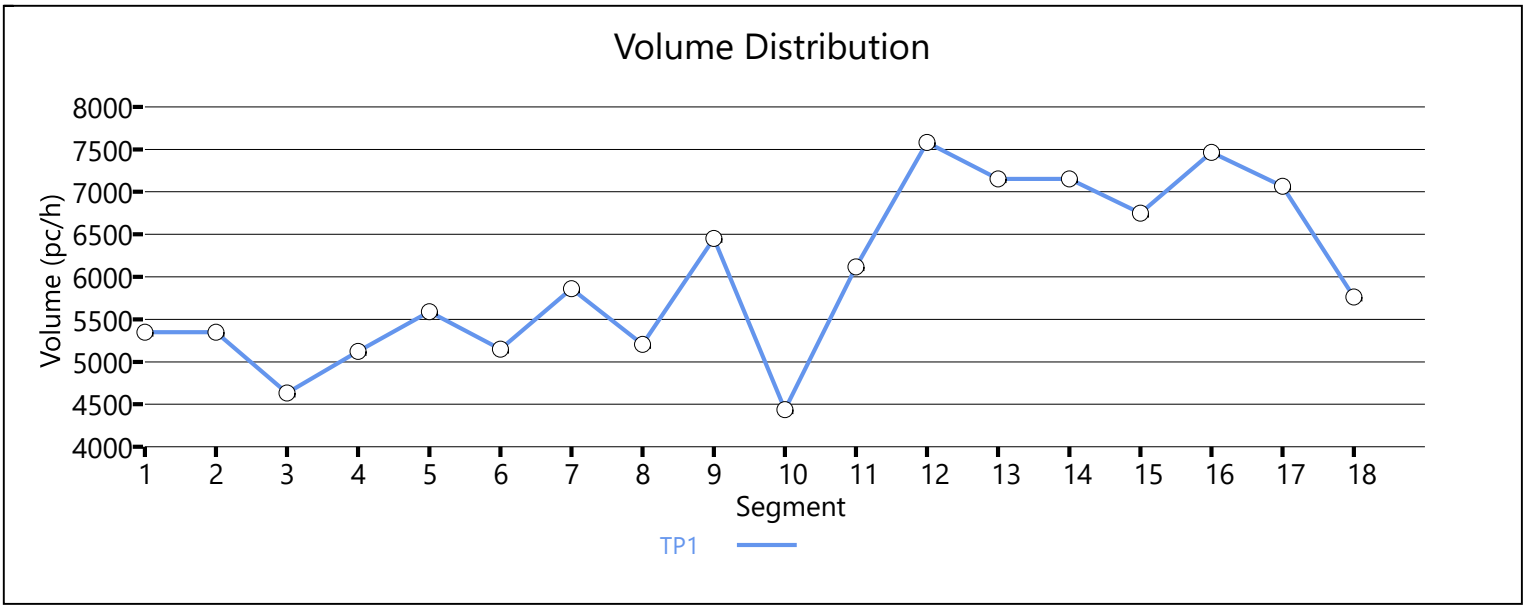
T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	50.6	30.7	28.8	7.50	D

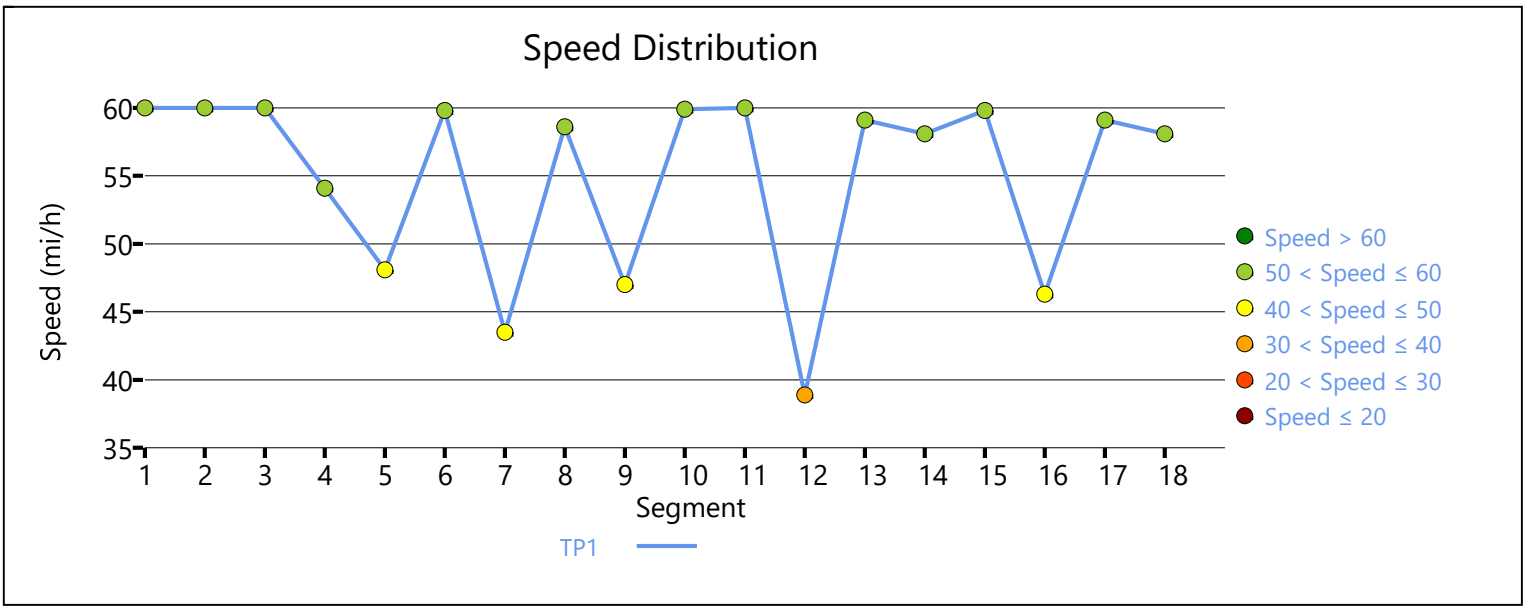
Facility Overall Results

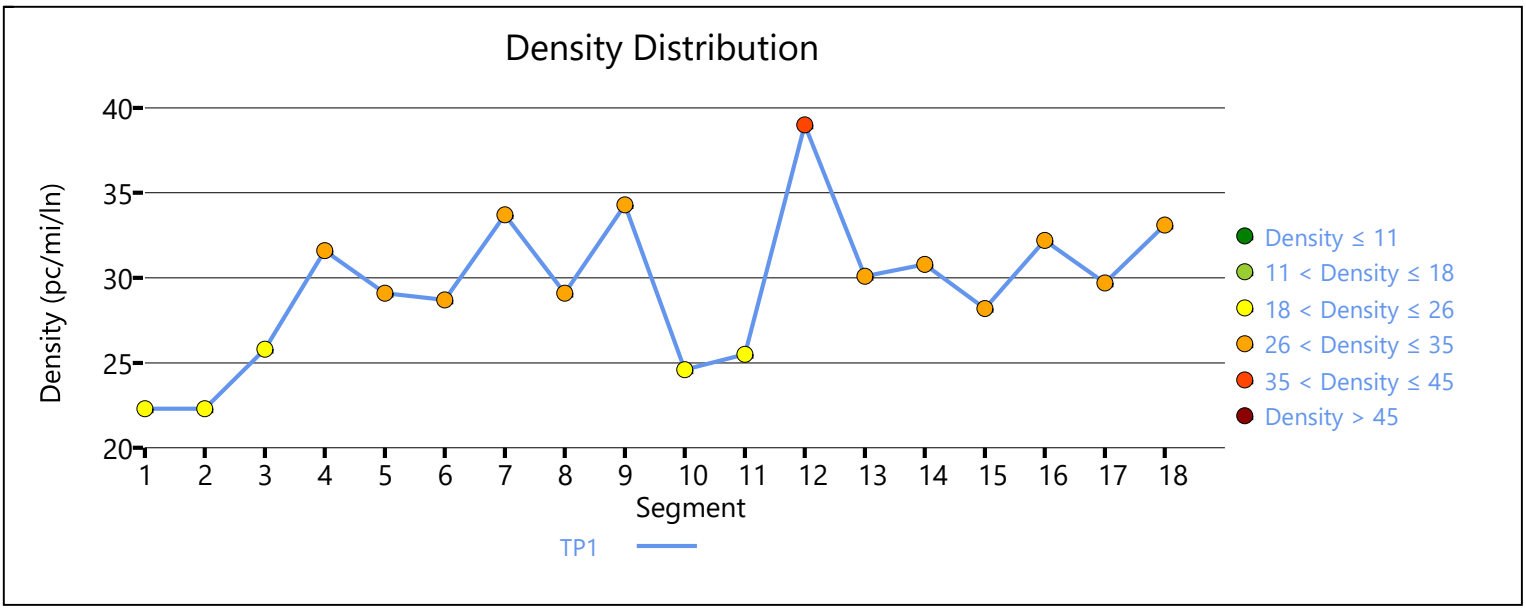
Space Mean Speed, mi/h	50.6	Density, veh/mi/ln	28.8
Average Travel Time, min	7.50	Density, pc/mi/ln	30.7

Messages

Comments







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HCS7 Basic Freeway Report

Project Information			
Analyst	MEL	Date	5/14/2020
Agency	Burgess & Niple	Analysis Year	2045 Interim Build
Jurisdiction		Time Period Analyzed	PM Peak Southbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary
Segment Number	1	Segment Name	North of Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity			
Demand Volume veh/h	4880	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1337
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.58
Passenger Car Equivalent (E_T)	2.000		

Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	60.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	2	Segment Name	Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4880	650
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	5347	719
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.58	0.34

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	22.3
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	22.3

HCS7 Basic Freeway Report

Project Information			
Segment Number	3	Segment Name	North of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1620	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4230	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1545
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	60.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	4	Segment Name	Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1090	770
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4230	450
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.980
Flow Rate (vi),pc/h	4634	488
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.74	0.23

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.354
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1858
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	53.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.599	Outer Lanes Freeway Speed (SO), mi/h	55.1
Flow in Lanes 1 and 2 (v12), pc/h	2776	Ramp Junction Speed (S), mi/h	54.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	3264	Average Density (D), pc/mi/ln	31.6
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	26.0

HCS7 Freeway Weaving Report

Project Information

Segment Number	5	Segment Name	Glenwood On to Perkins Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	3520	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.83	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4340	360	70	340
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.980	0.980	0.980
Flow Rate (v_i), pc/h	4755	391	76	369
Weaving Flow Rate (v_W), pc/h	760	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	4831	Density-Based Capacity (c_{IWL}), pc/h/ln		2272
Total Flow Rate (v), pc/h	5591	Demand Flow-Based Capacity (c_{IW}), pc/h		17647
Volume Ratio (VR)	0.136	Weaving Segment Capacity (c_W), veh/h		8837
Minimum Lane Change Rate (LC_{MIN}), lc/h	760	Adjusted Weaving Area Capacity, pc/h		9088
Maximum Weaving Length (L_{MAX}), ft	3892	Volume-to-Capacity Ratio (v/c)		0.62

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	3118	Average Weaving Speed (S_W), mi/h	50.5
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2766	Average Non-Weaving Speed (S_{NW}), mi/h	47.8
Weaving Lane Change Rate (LC_W), lc/h	1575	Average Speed (S), mi/h	48.1
Weaving Lane Change Rate (LC_{All}), lc/h	4341	Density (D), pc/mi/ln	29.1
Weaving Intensity Factor (W)	0.267	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information			
Segment Number	6	Segment Name	North of Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1300	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4700	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1716
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.75
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	28.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	7	Segment Name	Perkins On to Butchel Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	460	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4150	600	60	550
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	1.00	1.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.990	0.990	0.971
Flow Rate (v_i), pc/h	4547	645	64	603
Weaving Flow Rate (v_W), pc/h	1248	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	4611	Density-Based Capacity (c_{IWL}), pc/h/ln		1978
Total Flow Rate (v), pc/h	5859	Demand Flow-Based Capacity (c_{IW}), pc/h		11268
Volume Ratio (VR)	0.213	Weaving Segment Capacity (c_W), veh/h		7701
Minimum Lane Change Rate (LC_{MIN}), lc/h	1248	Adjusted Weaving Area Capacity, pc/h		7912
Maximum Weaving Length (L_{MAX}), ft	4670	Volume-to-Capacity Ratio (v/c)		0.74

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	495	Average Weaving Speed (S_W), mi/h	41.7
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	429	Average Non-Weaving Speed (S_{NW}), mi/h	44.0
Weaving Lane Change Rate (LC_W), lc/h	1455	Average Speed (S), mi/h	43.5
Weaving Lane Change Rate (LC_{All}), lc/h	1884	Density (D), pc/mi/ln	33.7
Weaving Intensity Factor (W)	0.687	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information			
Segment Number	8	Segment Name	North of Carroll On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1630	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4750	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1735
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.75
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	58.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	9	Segment Name	Carroll On to I-76 Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	2660	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.50	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3230	820	320	1520
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	3.00	3.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.971	0.971	0.971
Flow Rate (v_i), pc/h	3539	898	351	1665
Weaving Flow Rate (v_W), pc/h	2563	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	3890	Density-Based Capacity (c_{IWL}), pc/h/ln		2115
Total Flow Rate (v), pc/h	6453	Demand Flow-Based Capacity (c_{IW}), pc/h		8816
Volume Ratio (VR)	0.397	Weaving Segment Capacity (c_W), veh/h		8215
Minimum Lane Change Rate (LC_{MIN}), lc/h	898	Adjusted Weaving Area Capacity, pc/h		8460
Maximum Weaving Length (L_{MAX}), ft	5082	Volume-to-Capacity Ratio (v/c)		0.76

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	2587	Average Weaving Speed (S_W), mi/h	48.9
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2556	Average Non-Weaving Speed (S_{NW}), mi/h	45.8
Weaving Lane Change Rate (LC_W), lc/h	1724	Average Speed (S), mi/h	47.0
Weaving Lane Change Rate (LC_{All}), lc/h	4280	Density (D), pc/mi/ln	34.3
Weaving Intensity Factor (W)	0.329	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information			
Segment Number	10	Segment Name	North of EB I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2070	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4050	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1479
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.64
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	24.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	11	Segment Name	EB I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	130	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4050	1520
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	4437	1681
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.67	0.80

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	25.5
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	25.5

HCS7 Freeway Weaving Report

Project Information

Segment Number	12	Segment Name	I-76 On to Archwood Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1780	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5260	1270	70	310
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	4.00	4.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.962	0.962	0.980
Flow Rate (v_i), pc/h	5763	1404	77	337
Weaving Flow Rate (v_W), pc/h	1741	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	5840	Density-Based Capacity (c_{IWL}), pc/h/ln		2066
Total Flow Rate (v), pc/h	7581	Demand Flow-Based Capacity (c_{IW}), pc/h		10435
Volume Ratio (VR)	0.230	Weaving Segment Capacity (c_W), veh/h		10016
Minimum Lane Change Rate (LC_{MIN}), lc/h	2078	Adjusted Weaving Area Capacity, pc/h		10330
Maximum Weaving Length (L_{MAX}), ft	4845	Volume-to-Capacity Ratio (v/c)		0.73

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	2252	Average Weaving Speed (S_W), mi/h	43.3
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2991	Average Non-Weaving Speed (S_{NW}), mi/h	37.8
Weaving Lane Change Rate (LC_W), lc/h	3021	Average Speed (S), mi/h	38.9
Weaving Lane Change Rate (LC_{All}), lc/h	6012	Density (D), pc/mi/ln	39.0
Weaving Intensity Factor (W)	0.590	Level of Service (LOS)	E

HCS7 Basic Freeway Report

Project Information			
Segment Number	13	Segment Name	North of Wilbreth Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	690	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6530	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1788
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.78
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	30.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Diverge Report

Project Information

Segment Number	14	Segment Name	Wilbreth Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	560
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6530	370
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	7154	409
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.78	0.19

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.335
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1902
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	62.3
Flow in Lanes 1 and 2 (v12), pc/h	3350	Ramp Junction Speed (S), mi/h	58.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	30.8
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	28.0

HCS7 Basic Freeway Report

Project Information			
Segment Number	15	Segment Name	North of Wilbreth On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1430	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6160	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1687
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.73
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	28.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	16	Segment Name	Wilbreth on to Waterloo off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1840	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.83	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5890	560	110	270
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	1.00	1.00	1.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.990	0.990	0.990
Flow Rate (v_i), pc/h	6453	602	118	290
Weaving Flow Rate (v_W), pc/h	892	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	6571	Density-Based Capacity (c_{IWL}), pc/h/ln		2155
Total Flow Rate (v), pc/h	7463	Demand Flow-Based Capacity (c_{IW}), pc/h		20000
Volume Ratio (VR)	0.120	Weaving Segment Capacity (c_W), veh/h		10490
Minimum Lane Change Rate (LC_{MIN}), lc/h	892	Adjusted Weaving Area Capacity, pc/h		10775
Maximum Weaving Length (L_{MAX}), ft	3735	Volume-to-Capacity Ratio (v/c)		0.69

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	2217	Average Weaving Speed (S_W), mi/h	45.2
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	3154	Average Non-Weaving Speed (S_{NW}), mi/h	46.4
Weaving Lane Change Rate (LC_W), lc/h	1772	Average Speed (S), mi/h	46.3
Weaving Lane Change Rate (LC_{All}), lc/h	4926	Density (D), pc/mi/ln	32.2
Weaving Intensity Factor (W)	0.492	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information

Segment Number	17	Segment Name	277 WB Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	540	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6450	1190
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.943
Flow Rate (vi),pc/h	7067	1342
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.77	0.64

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	59.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	29.7
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	29.7

HCS7 Basic Freeway Report

Project Information

Segment Number	18	Segment Name	South of 277 WB Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5260	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1921
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.84
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	58.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	33.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

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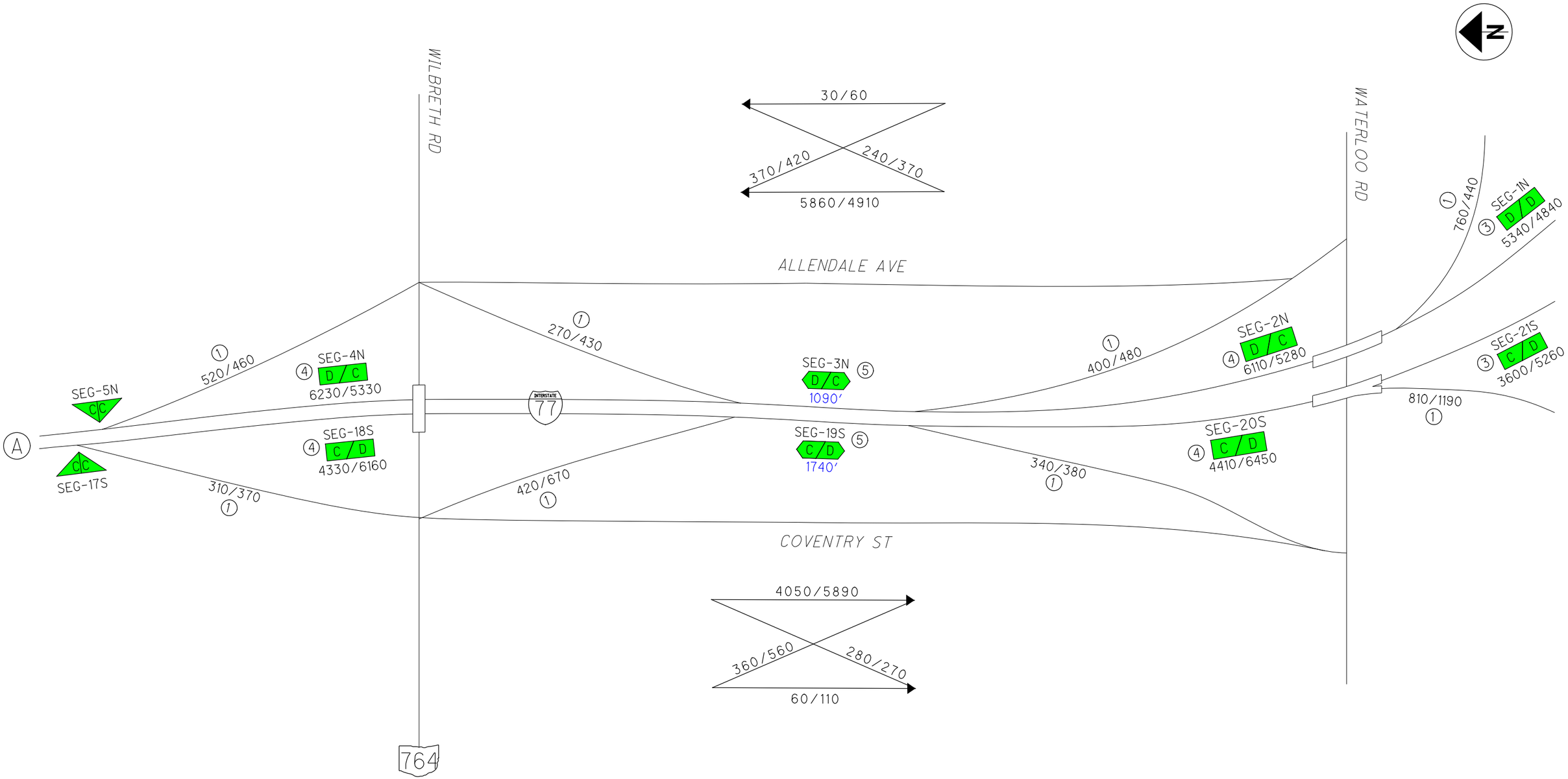
Appendix G

Full Build Freeway Analysis



Location Type

- Freeway Segment
- Weave Segment
- Merge/Diverge

LOS Guide

- LOS A - D
- LOS E
- LOS F

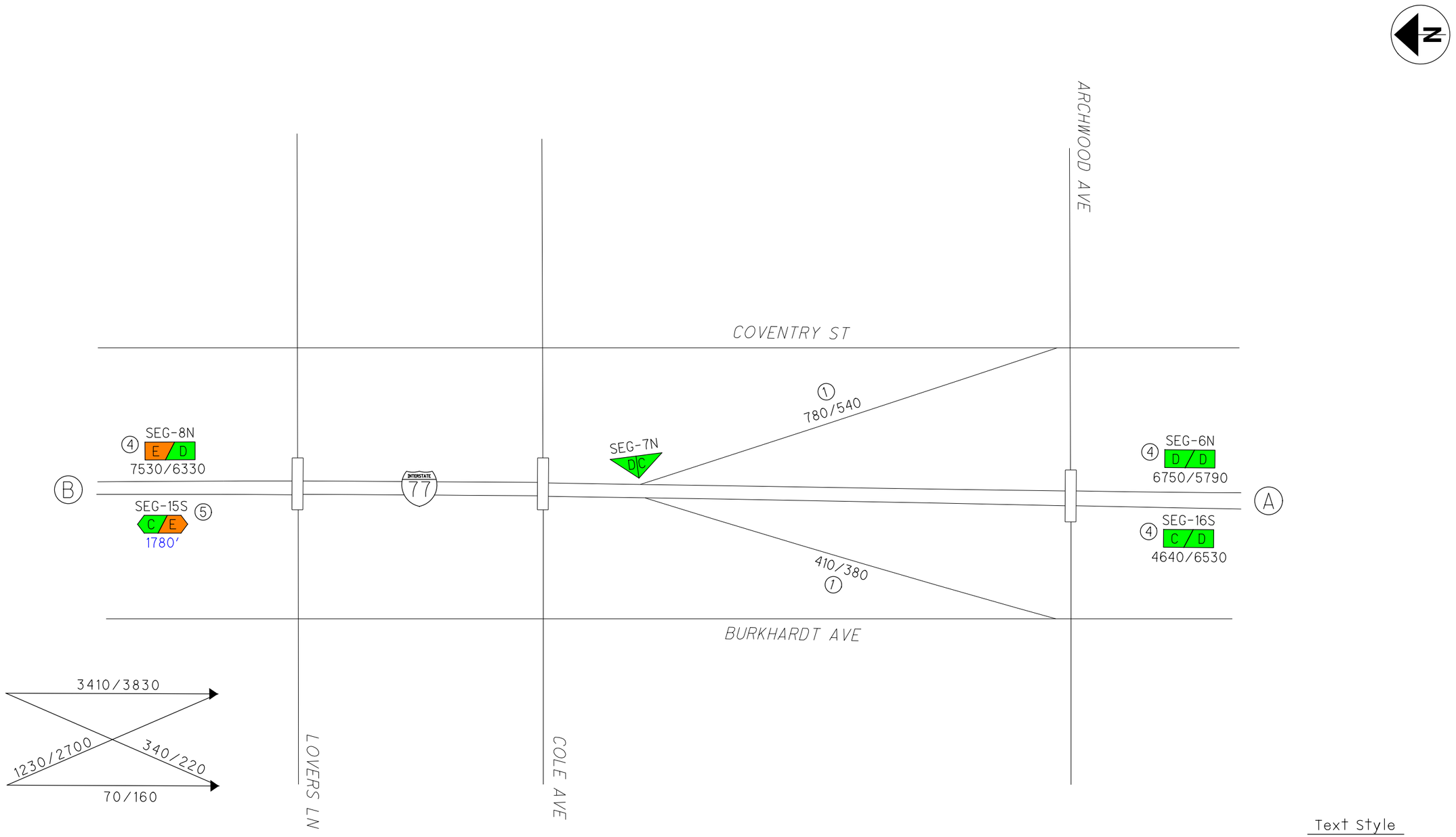
Text Style

AM/PM Traffic Volume

Weave Segment Short Length

(X) = # of Lanes

LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM FULL BUILD



Text Style

AM/PM Traffic Volume
Weave Segment Short Length
(X) = # of Lanes

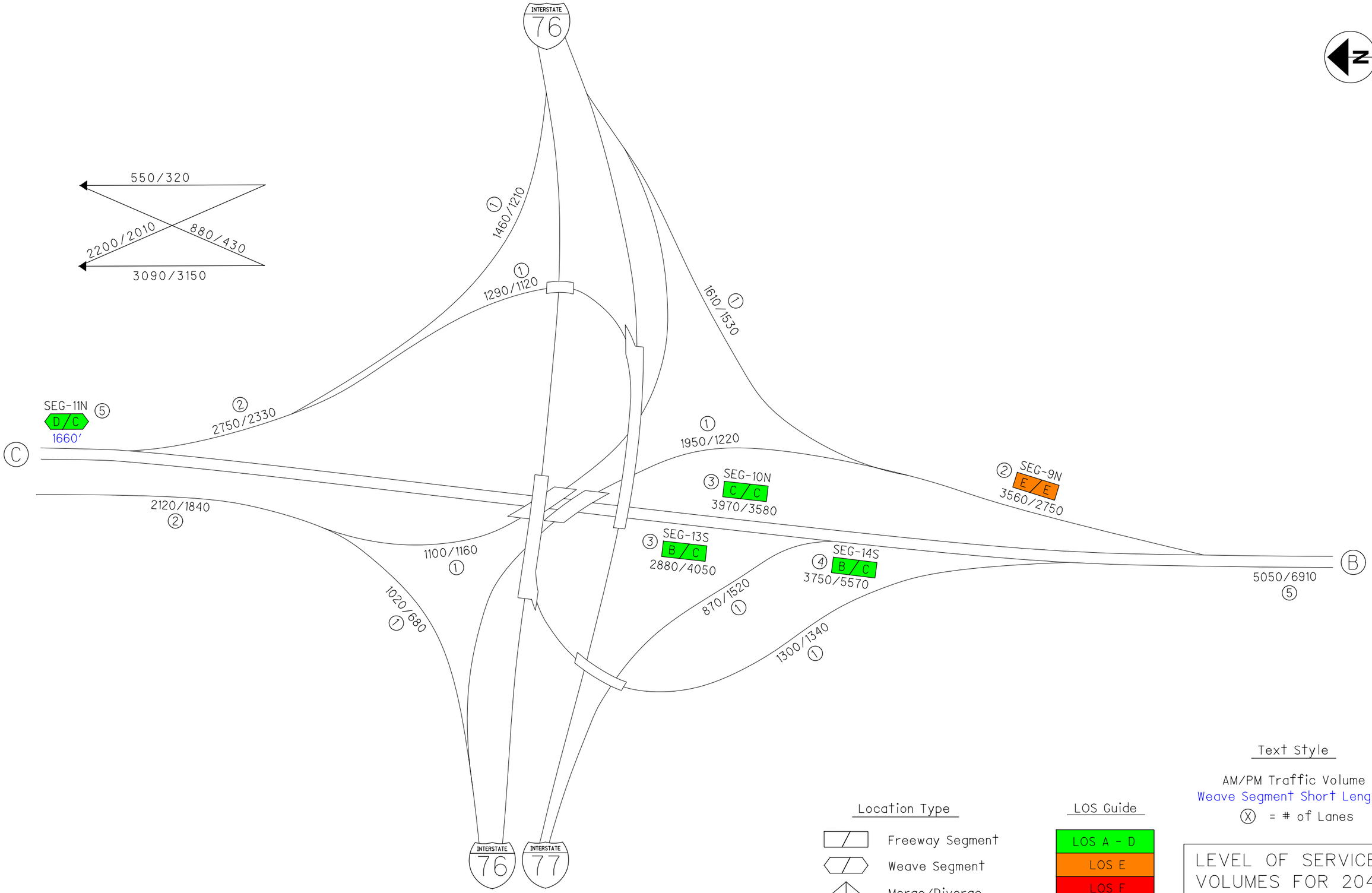
Location Type

- Freeway Segment
- Weave Segment
- Merge/Diverge

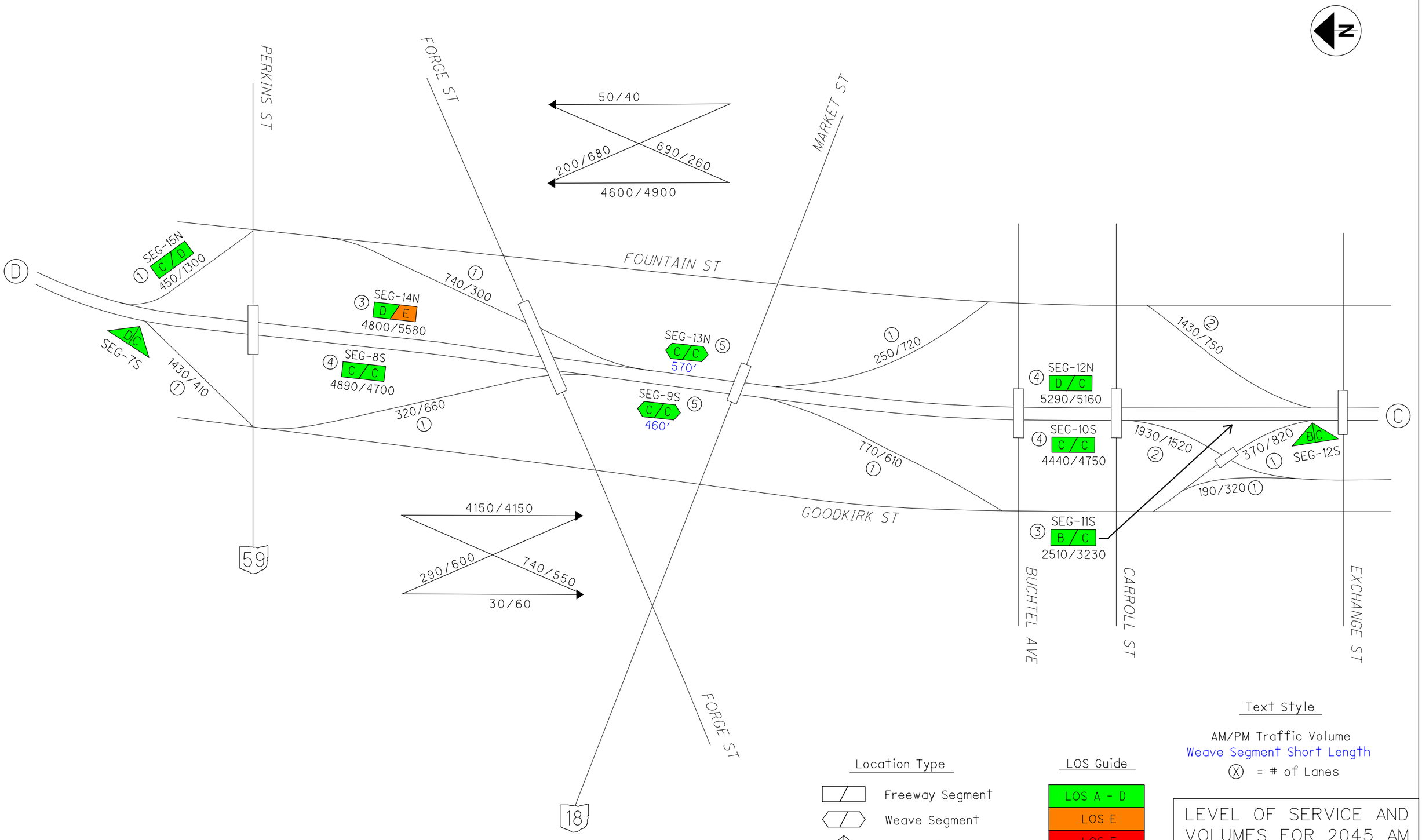
LOS Guide

- LOS A - D
- LOS E
- LOS F

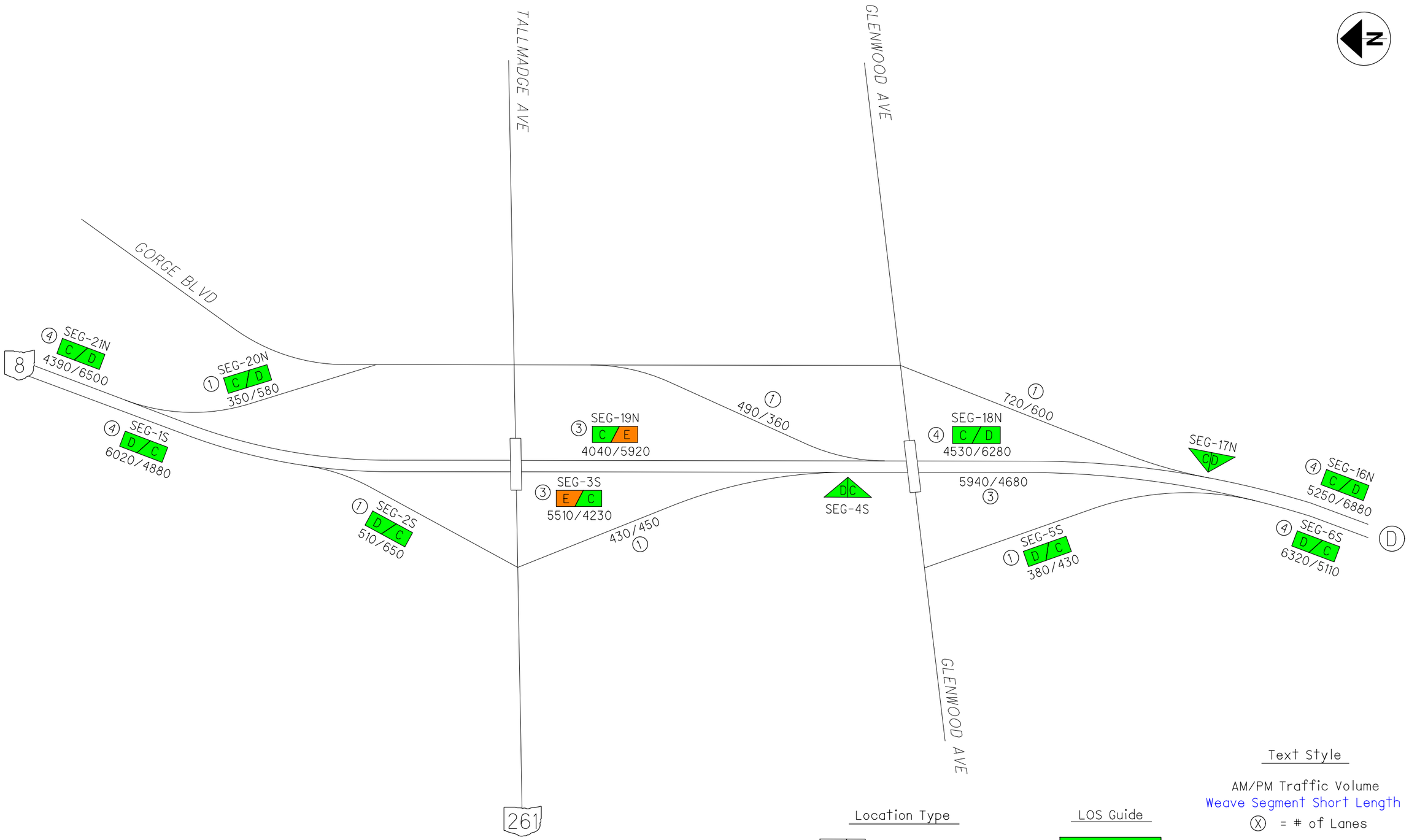
LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM FULL BUILD



LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM FULL BUILD



LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM FULL BUILD



LEVEL OF SERVICE AND VOLUMES FOR 2045 AM AND PM FULL BUILD

I-77 Northbound

AM Full Build

HCS Facilities and Segment Output

HCS7 Freeway Facilities Report

Project Information

Analyst	MEL	Date	5/18/2020
Agency	Burgess & Niple	Analysis Year	2045 Full Build
Jurisdiction		Time Period Analyzed	AM Peak Northbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary

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	21
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	6.36		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	South of WB I-277 On-ramp	2000	3
2	Merge	Basic	WB I-277 On-ramp	1080	4
3	Weaving	Weaving	Waterloo On to Wilbreth Off	2090	5
4	Basic	Basic	South of Wilbreth On	1880	4
5	Merge	Merge	Wilbreth On-ramp	1500	4
6	Basic	Basic	South of Archwood On-Ramp	1560	4
7	Merge	Merge	Archwood On-ramp	500	4
8	Overlap	Overlap	Archwood On to I-76 Off	1000	4
9	Diverge	Diverge	I-76 Off-ramp	500	4
10	Basic	Basic	South of I-76 On-Ramp	2840	3
11	Weaving	Weaving	I-76 On to Carroll Off	3370	5
12	Basic	Basic	South of Butchel On-Ramp	1640	4
13	Weaving	Weaving	Butchel On to Perkins Off	1570	5
14	Basic	Basic	South of Perkins On-Ramp	1850	3
15	Merge	Basic	Perkins On-Ramp	1500	4
16	Basic	Basic	South of Glenwood Off-Ramp	210	4
17	Diverge	Diverge	Glenwood Off-Ramp	1500	4
18	Diverge	Basic	Tallmadge Off-Ramp	1500	4
19	Basic	Basic	South of Tallmadge On-Ramp	2010	3
20	Merge	Basic	Tallmadge On-Ramp	1500	4
21	Basic	Basic	North of Tallmadge On-Ramp	2000	4

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5851	6900	0.85	57.8	33.7	D

Segment 2: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.962	6691	840	9200	2100	0.73	0.40	59.8	59.9	27.9	27.9	D

Segment 3: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	7125	10585	0.67	48.2	29.6	D

Segment 4: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	6826	9200	0.74	59.5	28.5	D

Segment 5: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.962	7401	575	9200	2100	0.80	0.27	53.9	53.3	34.3	27.3	C

Segment 6: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	7327	9200	0.80	59.0	31.1	D

Segment 7: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.971	8182	855	9200	2100	0.89	0.41	53.0	51.9	38.6	31.6	D

Segment 8: Overlap

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	8174	8952	0.91	53.1	38.8	E

Segment 9: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.952	8250	3978	9200	4200	0.90	0.95	53.1	48.2	38.8	48.0	E

Segment 10: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	4310	6900	0.62	59.5	24.0	C

Segment 11: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	7368	7576	0.97	46.6	31.6	D

Segment 12: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5796	8952	0.65	53.7	26.9	D

Segment 13: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	6060	10140	0.60	46.7	26.0	C

Segment 14: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5259	6900	0.76	59.2	29.4	D

Segment 15: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.971	5752	493	9200	2100	0.63	0.23	59.9	60.0	24.0	24.0	C

Segment 16: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5752	9200	0.63	60.0	24.0	C

Segment 17: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.943	5752	812	9200	2100	0.63	0.39	58.1	53.3	24.8	25.7	C

Segment 18: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.980	5010	532	9200	2100	0.54	0.25	59.8	60.0	20.9	20.9	C

Segment 19: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	4468	6900	0.65	60.0	24.8	C

Segment 20: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.952	4859	391	9200	2100	0.53	0.19	60.0	60.0	20.2	20.2	C

Segment 21: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	4855	9200	0.53	60.0	20.2	C

Facility Time Period Results

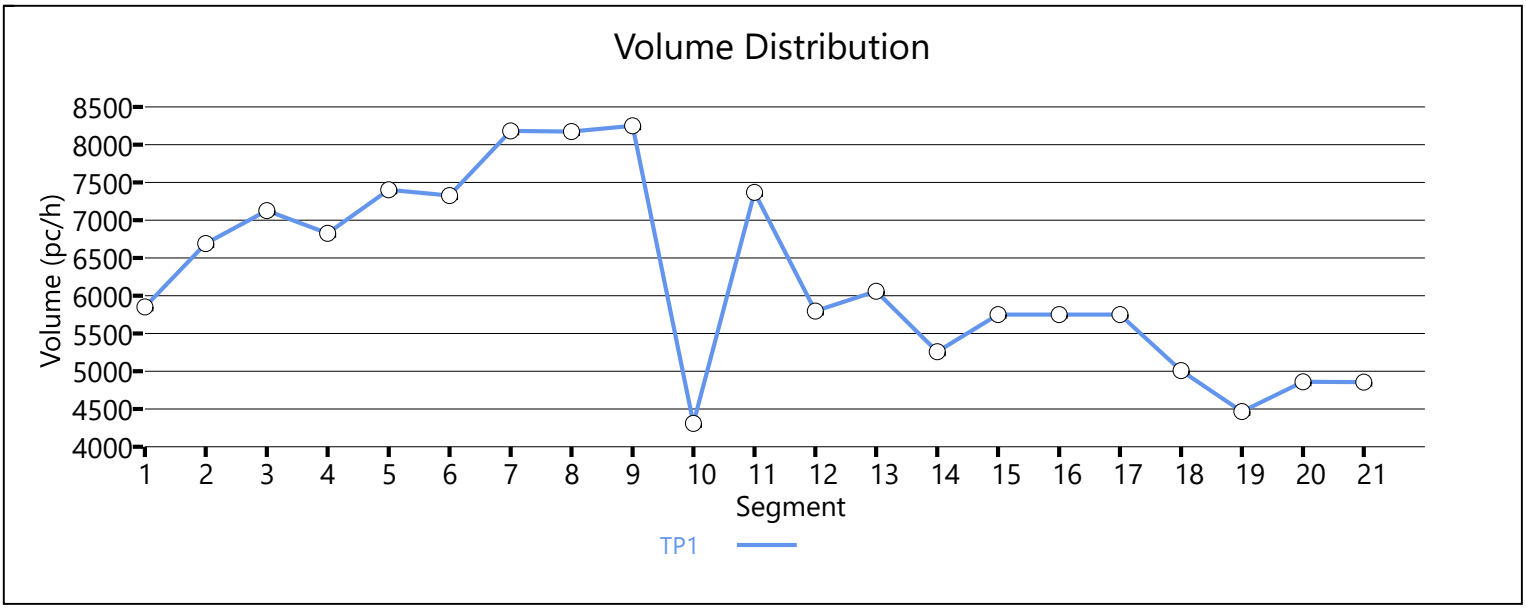
T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	54.8	27.9	26.7	7.00	D

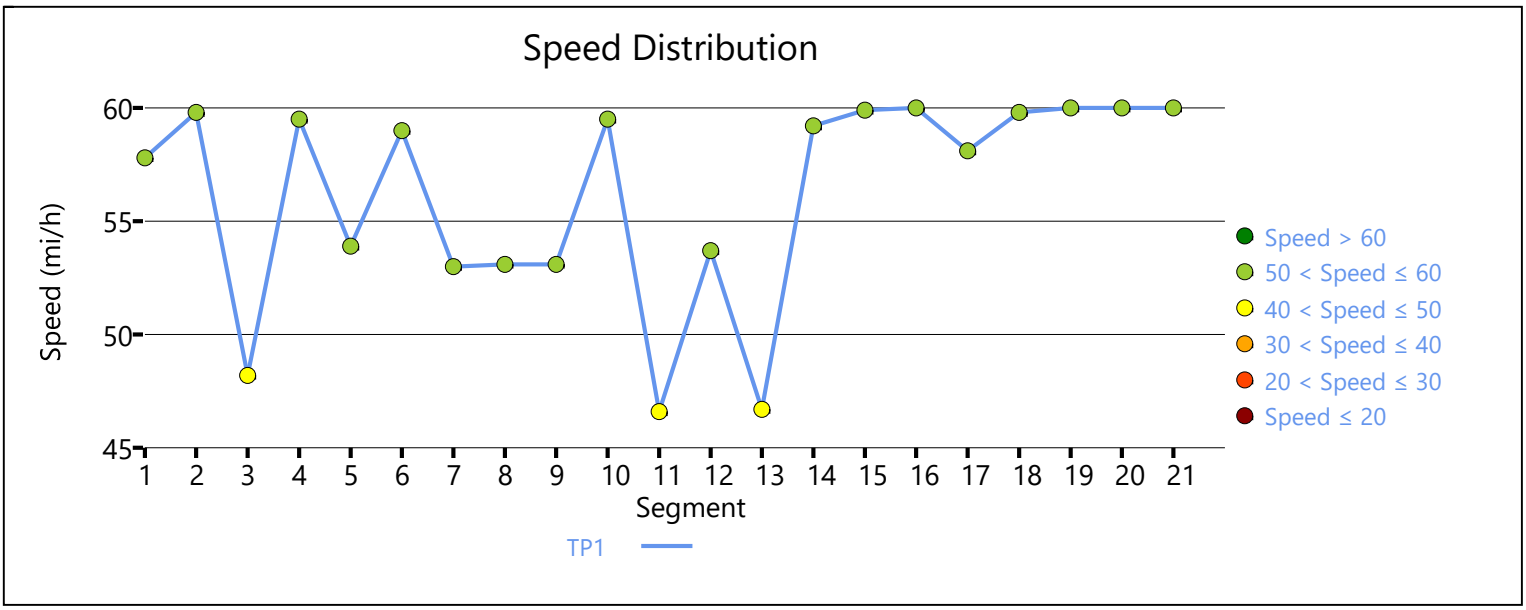
Facility Overall Results

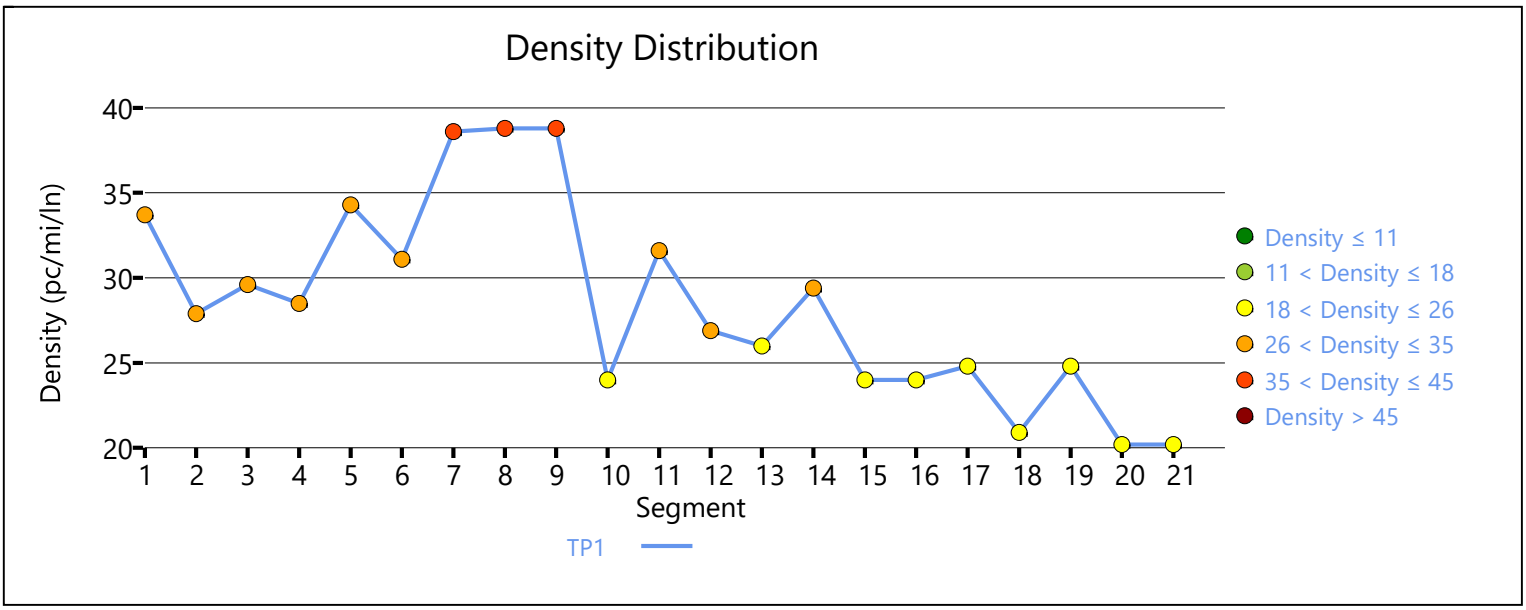
Space Mean Speed, mi/h	54.8	Density, veh/mi/ln	26.7
Average Travel Time, min	7.00	Density, pc/mi/ln	27.9

Messages

Comments







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HCS7 Basic Freeway Report

Project Information

Analyst	MEL	Date	5/18/2020
Agency	Burgess & Niple	Analysis Year	2045 Full Build
Jurisdiction		Time Period Analyzed	AM Peak Northbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary
Segment Number	1	Segment Name	South of WB I-277 On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5340	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1950
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.85
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	57.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	33.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	2	Segment Name	WB I-277 On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1080	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5340	760
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	5851	840
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.73	0.40

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	59.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	27.9
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	27.9

HCS7 Freeway Weaving Report

Project Information

Segment Number	3	Segment Name	Waterloo On to Wilbreth Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1090	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.67	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5860	370	30	240
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	4.00	4.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.962	0.962	0.971
Flow Rate (v_i), pc/h	6420	409	33	263

Weaving Flow Rate (v_W), pc/h	672	Freeway Max Capacity (c_{IFL}), pc/h/ln	2300
Non-Weaving Flow Rate (v_{NW}), pc/h	6453	Density-Based Capacity (c_{IWL}), pc/h/ln	2117
Total Flow Rate (v), pc/h	7125	Demand Flow-Based Capacity (c_{IW}), pc/h	25532
Volume Ratio (VR)	0.094	Weaving Segment Capacity (c_W), veh/h	10272
Minimum Lane Change Rate (LC_{MIN}), lc/h	672	Adjusted Weaving Area Capacity, pc/h	10585
Maximum Weaving Length (L_{MAX}), ft	3481	Volume-to-Capacity Ratio (v/c)	0.67

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1172	Average Weaving Speed (S_W), mi/h	47.2
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	957	Average Non-Weaving Speed (S_{NW}), mi/h	48.3
Weaving Lane Change Rate (LC_W), lc/h	1273	Average Speed (S), mi/h	48.2
Weaving Lane Change Rate (LC_{All}), lc/h	2230	Density (D), pc/mi/ln	29.6
Weaving Intensity Factor (W)	0.398	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information			
Segment Number	4	Segment Name	South of Wilbreth On
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1880	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6230	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1706
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.74
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	28.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	5	Segment Name	Wilbreth On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6230	520
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	6826	575
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.80	0.27

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.373
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2048
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	53.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.146	Outer Lanes Freeway Speed (SO), mi/h	54.4
Flow in Lanes 1 and 2 (v12), pc/h	2730	Ramp Junction Speed (S), mi/h	53.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	3305	Average Density (D), pc/mi/ln	34.3
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	27.3

HCS7 Basic Freeway Report

Project Information			
Segment Number	6	Segment Name	South of Archwood On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1560	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6750	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1832
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.80
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	31.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	7	Segment Name	Archwood On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	500	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6750	780
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.971
Flow Rate (vi),pc/h	7327	855
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.89	0.41

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.448
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2198
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	51.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.111	Outer Lanes Freeway Speed (SO), mi/h	53.9
Flow in Lanes 1 and 2 (v12), pc/h	2931	Ramp Junction Speed (S), mi/h	53.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	3786	Average Density (D), pc/mi/ln	38.6
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	31.6

HCS7 Overlap Freeway Report

Project Information			
Segment Number	8	Segment Name	Archwood On to I-76 Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	53.8
Right-Side Lateral Clearance, ft	10		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	7530	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2044
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2238
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2238
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.91
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	53.1
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	38.8
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	53.8		

HCS7 Freeway Diverge Report

Project Information

Segment Number	9	Segment Name	I-76 Off-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	2
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	500	0
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7530	3560
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.952
Flow Rate (vi),pc/h	8250	3978
Capacity (c), pc/h	9200	4200
Volume-to-Capacity Ratio (v/c)	0.90	0.95

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.656
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1581
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	48.2
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.260	Outer Lanes Freeway Speed (SO), mi/h	63.6
Flow in Lanes 1 and 2 (v12), pc/h	5089	Ramp Junction Speed (S), mi/h	53.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	38.8
Level of Service (LOS)	E	Density in Ramp Influence Area (DR), pc/mi/ln	48.0

HCS7 Basic Freeway Report

Project Information			
Segment Number	10	Segment Name	South of I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2840	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3970	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1437
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.62
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	24.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	11	Segment Name	I-76 On to Carroll Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1660	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3090	2200	550	880
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	4.00	4.00	4.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.962	0.962	0.962
Flow Rate (v_i), pc/h	3354	2433	608	973
Weaving Flow Rate (v_W), pc/h	3406	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	3962	Density-Based Capacity (c_{IWL}), pc/h/ln		1982
Total Flow Rate (v), pc/h	7368	Demand Flow-Based Capacity (c_{IW}), pc/h		7576
Volume Ratio (VR)	0.462	Weaving Segment Capacity (c_W), veh/h		7350
Minimum Lane Change Rate (LC_{MIN}), lc/h	973	Adjusted Weaving Area Capacity, pc/h		7576
Maximum Weaving Length (L_{MAX}), ft	5820	Volume-to-Capacity Ratio (v/c)		0.97

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1535	Average Weaving Speed (S_W), mi/h	47.4
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1411	Average Non-Weaving Speed (S_{NW}), mi/h	45.9
Weaving Lane Change Rate (LC_W), lc/h	1915	Average Speed (S), mi/h	46.6
Weaving Lane Change Rate (LC_{All}), lc/h	3326	Density (D), pc/mi/ln	31.6
Weaving Intensity Factor (W)	0.391	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information			
Segment Number	12	Segment Name	South of Butchel On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1640	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	53.8
Right-Side Lateral Clearance, ft	10		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5290	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1449
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2238
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2238
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.65
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	53.7
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.9
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	53.8		

HCS7 Freeway Weaving Report

Project Information

Segment Number	13	Segment Name	Butchel On to Perkins Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	570	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4600	200	50	690
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	5.00	5.00	1.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.952	0.952	0.990
Flow Rate (v_i), pc/h	5040	223	56	741
Weaving Flow Rate (v_W), pc/h	964	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	5096	Density-Based Capacity (c_{IWL}), pc/h/ln		2028
Total Flow Rate (v), pc/h	6060	Demand Flow-Based Capacity (c_{IW}), pc/h		15094
Volume Ratio (VR)	0.159	Weaving Segment Capacity (c_W), veh/h		9861
Minimum Lane Change Rate (LC_{MIN}), lc/h	964	Adjusted Weaving Area Capacity, pc/h		10140
Maximum Weaving Length (L_{MAX}), ft	4121	Volume-to-Capacity Ratio (v/c)		0.60

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	629	Average Weaving Speed (S_W), mi/h	44.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	396	Average Non-Weaving Speed (S_{NW}), mi/h	47.2
Weaving Lane Change Rate (LC_W), lc/h	1367	Average Speed (S), mi/h	46.7
Weaving Lane Change Rate (LC_{All}), lc/h	1763	Density (D), pc/mi/ln	26.0
Weaving Intensity Factor (W)	0.551	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information			
Segment Number	14	Segment Name	South of Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1850	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4800	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1753
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.76
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	15	Segment Name	Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4800	450
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.971
Flow Rate (vi),pc/h	5259	493
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.63	0.23

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	24.0
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	24.0

HCS7 Basic Freeway Report

Project Information			
Segment Number	16	Segment Name	South of Glenwood Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	210	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5250	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1438
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.63
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	60.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	24.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Diverge Report

Project Information

Segment Number	17	Segment Name	Glenwood Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	450
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	5250	720
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.943
Flow Rate (v_i),pc/h	5752	812
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.63	0.39

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	2
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.371
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	1393
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	53.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	0.436	Outer Lanes Freeway Speed (S_O), mi/h	64.3
Flow in Lanes 1 and 2 (v_{12}), pc/h	2966	Ramp Junction Speed (S), mi/h	58.1
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	24.8
Level of Service (LOS)	C	Density in Ramp Influence Area (D_R), pc/mi/ln	25.7

HCS7 Basic Freeway Report

Project Information

Segment Number	18	Segment Name	Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4530	490
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.980
Flow Rate (vi),pc/h	5010	532
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.54	0.25

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	20.9
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	20.9

HCS7 Basic Freeway Report

Project Information			
Segment Number	19	Segment Name	South of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2010	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4040	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1489
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.65
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	60.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	24.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	20	Segment Name	Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4040	350
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.952
Flow Rate (vi),pc/h	4468	391
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.53	0.19

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	20.2
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	20.2

HCS7 Basic Freeway Report

Project Information

Segment Number	21	Segment Name	North of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4390	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1214
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.53
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	60.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	20.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

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I-77 Northbound

PM Full Build

HCS Facilities and Segment Output

HCS7 Freeway Facilities Report

Project Information

Analyst	MEL	Date	5/18/2020
Agency	Burgess & Niple	Analysis Year	2045 Full Build
Jurisdiction		Time Period Analyzed	PM Peak Northbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary

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	21
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	6.36		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	South of WB I-277 On-ramp	2000	3
2	Merge	Basic	WB I-277 On-ramp	1080	4
3	Weaving	Weaving	Waterloo On to Wilbreth Off	2090	5
4	Basic	Basic	South of Wilbreth On	1880	4
5	Merge	Merge	Wilbreth On-ramp	1500	4
6	Basic	Basic	South of Archwood On-Ramp	1560	4
7	Merge	Merge	Archwood On-ramp	500	4
8	Overlap	Overlap	Archwood On to I-76 Off	1000	4
9	Diverge	Diverge	I-76 Off-ramp	500	4
10	Basic	Basic	South of I-76 On-Ramp	2840	3
11	Weaving	Weaving	I-76 On to Carroll Off	3370	5
12	Basic	Basic	South of Butchel On-Ramp	1640	4
13	Weaving	Weaving	Butchel On to Perkins Off	1570	5
14	Basic	Basic	South of Perkins On-Ramp	1850	3
15	Merge	Basic	Perkins On-Ramp	1500	4
16	Basic	Basic	South of Glenwood Off-Ramp	210	4
17	Diverge	Diverge	Glenwood Off-Ramp	1500	4
18	Diverge	Basic	Tallmadge Off-Ramp	1500	4
19	Basic	Basic	South of Tallmadge On-Ramp	2010	3
20	Merge	Basic	Tallmadge On-Ramp	1500	4
21	Basic	Basic	North of Tallmadge On-Ramp	2000	4

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	5254	6900	0.76	59.6	29.4	D

Segment 2: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.952	5746	492	9200	2100	0.62	0.23	60.0	60.0	23.9	23.9	C

Segment 3: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6253	10426	0.60	47.7	26.2	C

Segment 4: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	5786	9200	0.63	59.5	24.1	C

Segment 5: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.980	6285	499	9200	2100	0.68	0.24	54.9	54.0	28.6	23.5	C

Segment 6: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6285	9200	0.68	59.6	26.2	D

Segment 7: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.990	6865	580	9200	2100	0.75	0.28	54.3	53.5	31.6	26.3	C

Segment 8: Overlap

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6871	8952	0.77	54.7	31.7	D

Segment 9: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.943	6935	3102	9200	4200	0.75	0.74	54.7	49.6	31.7	39.5	E

Segment 10: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	3886	6900	0.56	59.6	21.6	C

Segment 11: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6415	8474	0.76	49.9	25.7	C

Segment 12: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	5601	8952	0.63	53.7	26.0	C

Segment 13: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6372	10140	0.63	46.1	27.6	C

Segment 14: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6057	6900	0.88	56.8	35.5	E

Segment 15: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.990	7454	1397	9200	2100	0.81	0.67	58.7	58.7	31.7	31.7	D

Segment 16: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	7469	9200	0.81	58.7	31.8	D

Segment 17: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.971	7469	657	9200	2100	0.81	0.31	57.7	53.6	32.4	31.4	D

Segment 18: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.980	6817	391	9200	2100	0.74	0.19	59.8	59.8	28.5	28.5	D

Segment 19: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	6426	6900	0.93	54.7	39.2	E

Segment 20: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.980	0.952	7074	648	9200	2100	0.77	0.31	59.5	59.5	29.7	29.7	D

Segment 21: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.980	7056	9200	0.77	59.5	29.6	D

Facility Time Period Results

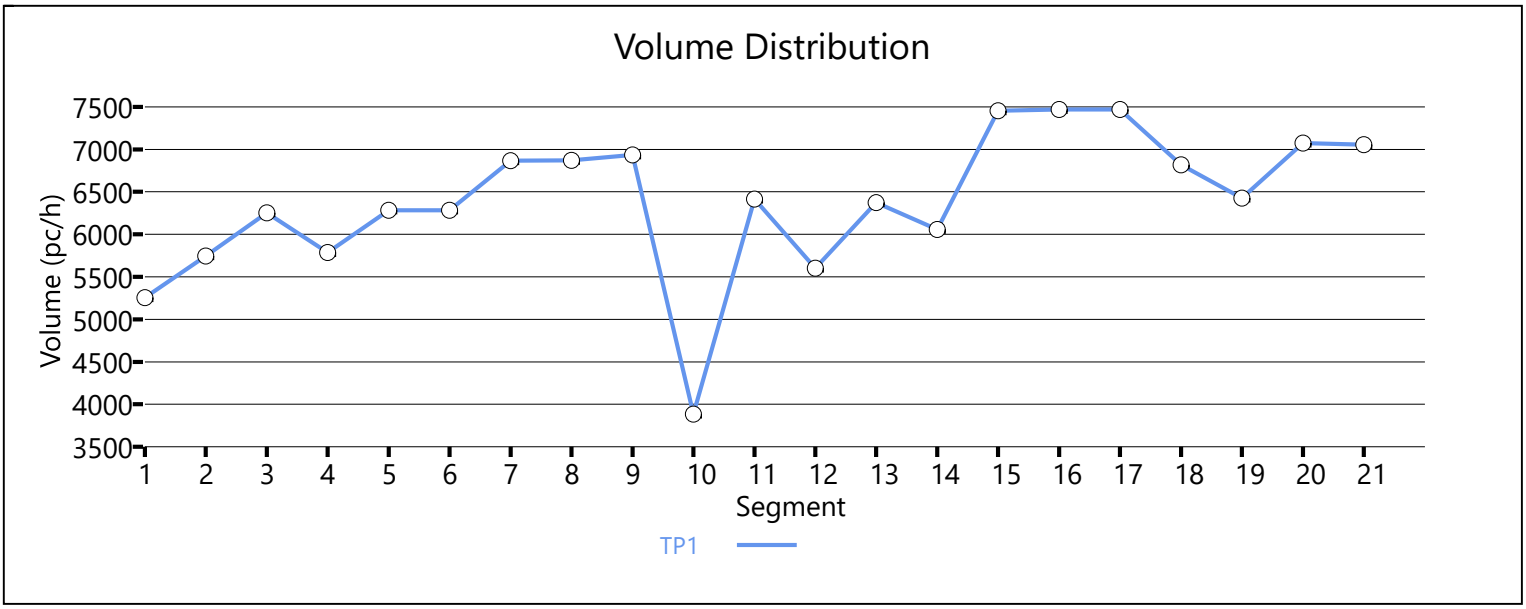
T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	55.4	28.3	27.3	6.90	D

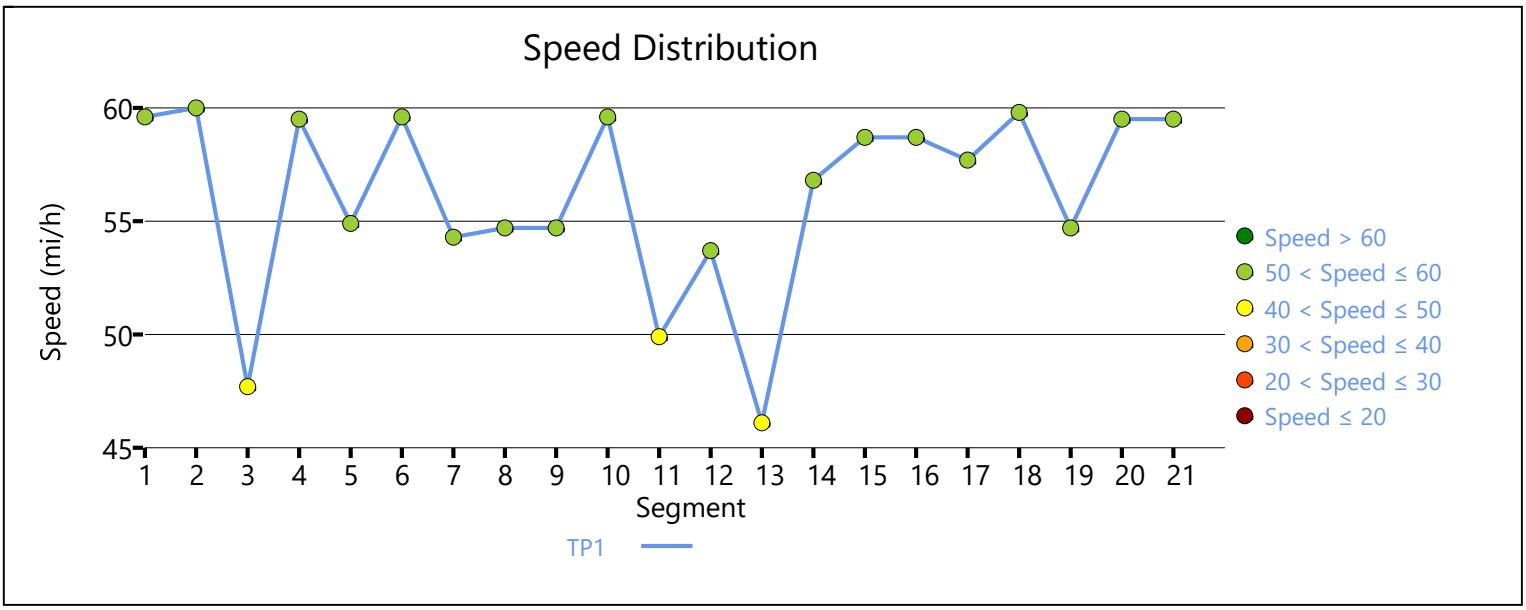
Facility Overall Results

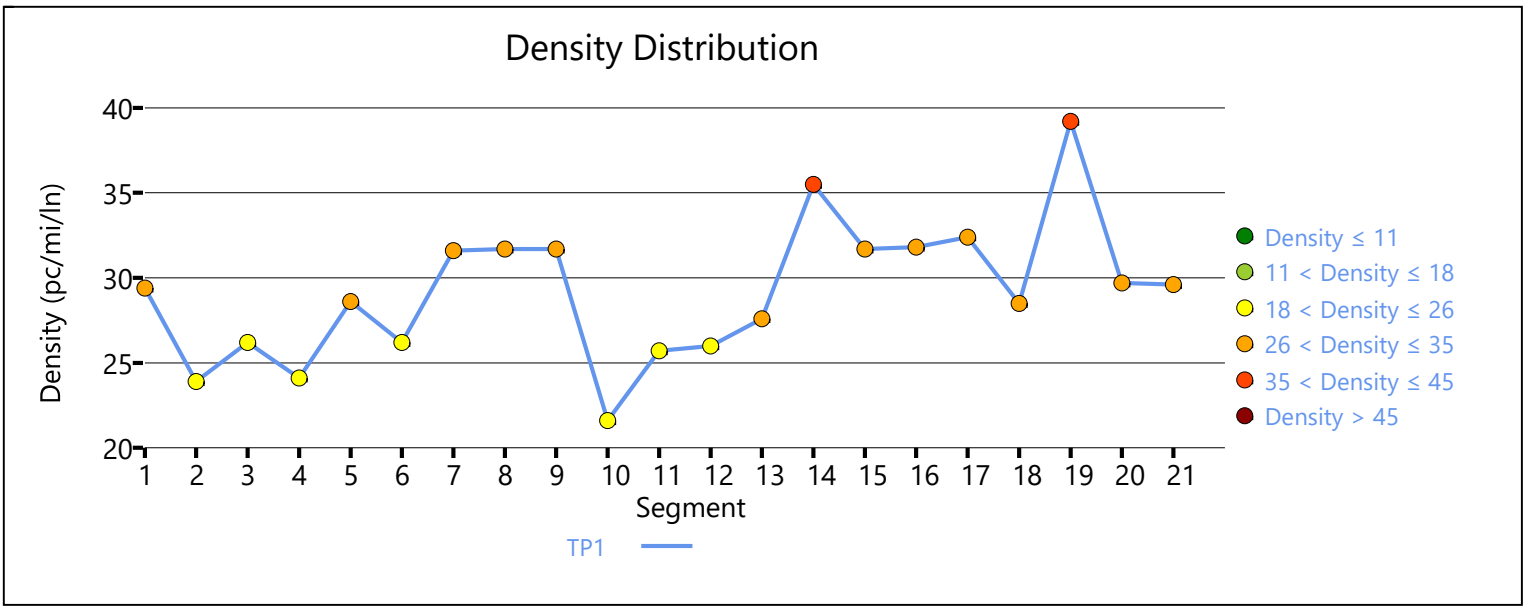
Space Mean Speed, mi/h	55.4	Density, veh/mi/ln	27.3
Average Travel Time, min	6.90	Density, pc/mi/ln	28.3

Messages

Comments







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HCS7 Basic Freeway Report

Project Information			
Analyst	MEL	Date	5/18/2020
Agency	Burgess & Niple	Analysis Year	2045 Full Build
Jurisdiction		Time Period Analyzed	PM Peak Northbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary
Segment Number	1	Segment Name	South of WB I-277 On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity			
Demand Volume veh/h	4840	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1751
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.76
Passenger Car Equivalent (E_T)	2.000		

Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	2	Segment Name	WB I-277 On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1080	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4840	440
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.952
Flow Rate (vi),pc/h	5254	492
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.62	0.23

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	23.9
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	23.9

HCS7 Freeway Weaving Report

Project Information

Segment Number	3	Segment Name	Waterloo On to Wilbreth Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1090	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.67	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4910	420	60	370
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.980	0.980	0.980
Flow Rate (v_i), pc/h	5330	456	65	402
Weaving Flow Rate (v_W), pc/h	858	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	5395	Density-Based Capacity (c_{IWL}), pc/h/ln		2085
Total Flow Rate (v), pc/h	6253	Demand Flow-Based Capacity (c_{IW}), pc/h		17518
Volume Ratio (VR)	0.137	Weaving Segment Capacity (c_W), veh/h		10217
Minimum Lane Change Rate (LC_{MIN}), lc/h	858	Adjusted Weaving Area Capacity, pc/h		10426
Maximum Weaving Length (L_{MAX}), ft	3902	Volume-to-Capacity Ratio (v/c)		0.60

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	980	Average Weaving Speed (S_W), mi/h	47.3
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	739	Average Non-Weaving Speed (S_{NW}), mi/h	47.8
Weaving Lane Change Rate (LC_W), lc/h	1459	Average Speed (S), mi/h	47.7
Weaving Lane Change Rate (LC_{All}), lc/h	2198	Density (D), pc/mi/ln	26.2
Weaving Intensity Factor (W)	0.393	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information			
Segment Number	4	Segment Name	South of Wilbreth On
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1880	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5330	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1446
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.63
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	24.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	5	Segment Name	Wilbreth On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5330	460
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.980
Flow Rate (vi),pc/h	5786	499
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.68	0.24

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.332
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1736
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	54.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.155	Outer Lanes Freeway Speed (SO), mi/h	55.6
Flow in Lanes 1 and 2 (v12), pc/h	2314	Ramp Junction Speed (S), mi/h	54.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	2813	Average Density (D), pc/mi/ln	28.6
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	23.5

HCS7 Basic Freeway Report

Project Information			
Segment Number	6	Segment Name	South of Archwood On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1560	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5790	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1571
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.68
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	26.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	7	Segment Name	Archwood On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	500	500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5790	540
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.990
Flow Rate (vi),pc/h	6285	580
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.75	0.28

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.362
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1886
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	53.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.145	Outer Lanes Freeway Speed (SO), mi/h	55.0
Flow in Lanes 1 and 2 (v12), pc/h	2514	Ramp Junction Speed (S), mi/h	54.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	3094	Average Density (D), pc/mi/ln	31.6
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	26.3

HCS7 Overlap Freeway Report

Project Information			
Segment Number	8	Segment Name	Archwood On to I-76 Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	53.8
Right-Side Lateral Clearance, ft	10		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6330	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1718
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2238
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2238
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.77
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	54.7
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	31.7
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	53.8		

HCS7 Freeway Diverge Report

Project Information

Segment Number	9	Segment Name	I-76 Off-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	2
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	500	0
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6330	2750
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.943
Flow Rate (vi),pc/h	6935	3102
Capacity (c), pc/h	9200	4200
Volume-to-Capacity Ratio (v/c)	0.75	0.74

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.577
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1418
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	49.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.260	Outer Lanes Freeway Speed (SO), mi/h	64.2
Flow in Lanes 1 and 2 (v12), pc/h	4099	Ramp Junction Speed (S), mi/h	54.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	31.7
Level of Service (LOS)	E	Density in Ramp Influence Area (DR), pc/mi/ln	39.5

HCS7 Basic Freeway Report

Project Information			
Segment Number	10	Segment Name	South of I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2840	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3580	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1295
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.56
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	11	Segment Name	I-76 On to Carroll Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1660	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	0
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3150	2010	320	430
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.980	0.980	0.980
Flow Rate (v_i), pc/h	3419	2182	347	467
Weaving Flow Rate (v_W), pc/h	2649	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	3766	Density-Based Capacity (c_{IWL}), pc/h/ln		2024
Total Flow Rate (v), pc/h	6415	Demand Flow-Based Capacity (c_{IW}), pc/h		8475
Volume Ratio (VR)	0.413	Weaving Segment Capacity (c_W), veh/h		8305
Minimum Lane Change Rate (LC_{MIN}), lc/h	467	Adjusted Weaving Area Capacity, pc/h		8474
Maximum Weaving Length (L_{MAX}), ft	5261	Volume-to-Capacity Ratio (v/c)		0.76

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1459	Average Weaving Speed (S_W), mi/h	49.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1157	Average Non-Weaving Speed (S_{NW}), mi/h	50.5
Weaving Lane Change Rate (LC_W), lc/h	1409	Average Speed (S), mi/h	49.9
Weaving Lane Change Rate (LC_{All}), lc/h	2566	Density (D), pc/mi/ln	25.7
Weaving Intensity Factor (W)	0.319	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information			
Segment Number	12	Segment Name	South of Butchel On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1640	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.17
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	53.8
Right-Side Lateral Clearance, ft	10		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5160	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1400
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2238
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2238
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.63
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	53.7
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	26.0
Total Ramp Density Adjustment	6.2	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	53.8		

HCS7 Freeway Weaving Report

Project Information

Segment Number	13	Segment Name	Butchel On to Perkins Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	570	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4900	680	40	260
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	2.00	1.00	1.00	1.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.980	0.990	0.990	0.990
Flow Rate (v_i), pc/h	5319	731	43	279
Weaving Flow Rate (v_W), pc/h	1010	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	5362	Density-Based Capacity (c_{IWL}), pc/h/ln		2028
Total Flow Rate (v), pc/h	6372	Demand Flow-Based Capacity (c_{IW}), pc/h		15094
Volume Ratio (VR)	0.159	Weaving Segment Capacity (c_W), veh/h		9954
Minimum Lane Change Rate (LC_{MIN}), lc/h	1010	Adjusted Weaving Area Capacity, pc/h		10140
Maximum Weaving Length (L_{MAX}), ft	4121	Volume-to-Capacity Ratio (v/c)		0.63

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	662	Average Weaving Speed (S_W), mi/h	43.6
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	451	Average Non-Weaving Speed (S_{NW}), mi/h	46.6
Weaving Lane Change Rate (LC_W), lc/h	1413	Average Speed (S), mi/h	46.1
Weaving Lane Change Rate (LC_{All}), lc/h	1864	Density (D), pc/mi/ln	27.6
Weaving Intensity Factor (W)	0.576	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information			
Segment Number	14	Segment Name	South of Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1850	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5580	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2019
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.88
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	56.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	35.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	15	Segment Name	Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5580	1300
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.990
Flow Rate (vi),pc/h	6057	1397
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.81	0.67

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	58.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	58.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	31.7
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	31.7

HCS7 Basic Freeway Report

Project Information			
Segment Number	16	Segment Name	South of Glenwood Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	210	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.67
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6880	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1867
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.81
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	58.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	31.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Diverge Report

Project Information

Segment Number	17	Segment Name	Glenwood Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	450
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6880	600
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.971
Flow Rate (vi),pc/h	7469	657
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.81	0.31

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.357
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1921
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	53.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	62.2
Flow in Lanes 1 and 2 (v12), pc/h	3627	Ramp Junction Speed (S), mi/h	57.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	32.4
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	31.4

HCS7 Basic Freeway Report

Project Information

Segment Number	18	Segment Name	Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6280	360
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.980
Flow Rate (vi),pc/h	6817	391
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.74	0.19

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	59.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	28.5
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	28.5

HCS7 Basic Freeway Report

Project Information			
Segment Number	19	Segment Name	South of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2010	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5920	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2142
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.93
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	54.7
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	39.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	20	Segment Name	Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5920	580
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	2.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.952
Flow Rate (vi),pc/h	6426	648
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.77	0.31

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	59.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	29.7
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	29.7

HCS7 Basic Freeway Report

Project Information

Segment Number	21	Segment Name	North of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6500	Heavy Vehicle Adjustment Factor (f_{HV})	0.980
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1764
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.77
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.5
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

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I-77 Southbound

AM Full Build

HCS Facilities and Segment Output

HCS7 Freeway Facilities Report

Project Information

Analyst	MEL	Date	5/14/2020
Agency	Burgess & Niple	Analysis Year	2045 Full Build
Jurisdiction		Time Period Analyzed	AM Peak Southbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary

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	21
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	6.31		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	North of Tallmadge Off-Ramp	2000	4
2	Diverge	Basic	Tallmadge Off-Ramp	1500	4
3	Basic	Basic	North of Tallmadge On-Ramp	1620	3
4	Merge	Merge	Tallmadge On-Ramp	1500	3
5	Merge	Basic	Glenwood On-Ramp	1500	4
6	Basic	Basic	Glenwood On to Perkins Off	770	4
7	Diverge	Diverge	Perkins Off-Ramp	1500	4
8	Basic	Basic	North of Perkins On-Ramp	1800	4
9	Weaving	Weaving	Perkins On to Butchel Off	1460	5
10	Diverge	Basic	I-76 Off-Ramp	1400	4
11	Basic	Basic	North of Carroll On-Ramp	1650	3
12	Merge	Merge	Carroll On-Ramp	1500	3
13	Basic	Basic	North of EB I-76 On-Ramp	2810	3
14	Merge	Basic	EB I-76 On-Ramp	130	4
15	Weaving	Weaving	I-76 On to Archwood Off	3180	5
16	Basic	Basic	North of Wilbreth Off-Ramp	690	4
17	Diverge	Diverge	Wilbreth Off-Ramp	1500	4
18	Basic	Basic	North of Wilbreth On-ramp	1430	4
19	Weaving	Weaving	Wilbreth on to Waterloo off	2840	5
20	Diverge	Basic	277 WB Off-Ramp	540	4
21	Basic	Basic	South of 277 WB Off-Ramp	2000	3

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	6657	9200	0.72	59.9	27.8	D

Segment 2: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.943	6657	575	9200	2100	0.72	0.27	59.9	59.9	27.8	27.8	D

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	6093	6900	0.88	56.6	35.9	E

Segment 4: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.917	6592	499	6900	2100	0.96	0.24	51.6	51.0	42.6	32.9	D

Segment 5: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.909	7014	445	9200	2100	0.76	0.21	59.3	59.6	29.4	29.4	D

Segment 6: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.962	6989	9200	0.76	59.6	29.3	D

Segment 7: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.962	0.980	6989	1552	9200	2100	0.76	0.74	56.6	52.1	30.9	34.9	D

Segment 8: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	5464	9200	0.59	59.8	22.8	C

Segment 9: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.952	5796	9965	0.58	45.5	25.5	C

Segment 10: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.952	0.971	4962	2115	9200	2100	0.54	1.01	58.6	60.0	20.7	20.7	C

Segment 11: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.94		0.952		2805		6900		0.41		59.9		15.6		B
Segment 12: Merge															
Time Period	**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**	**Freeway**	**Ramp**	
1	0.94	0.94	0.952	0.971	3210	405	6900	2000	0.47	0.20	55.7	54.7	19.2	16.6	B
Segment 13: Basic															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.952		3218		6900		0.47		59.9		17.9		B
Segment 14: Merge															
Time Period	**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**	**Freeway**	**Ramp**	
1	0.94	0.94	0.952	0.935	4208	990	9200	2100	0.46	0.47	60.0	60.0	17.5	17.5	B
Segment 15: Weaving															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.952		5663		7668		0.74		41.0		27.6		C
Segment 16: Basic															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.935		5279		9200		0.57		59.2		22.0		C
Segment 17: Diverge															
Time Period	**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**	**Freeway**	**Ramp**	
1	0.94	0.94	0.935	0.962	5279	343	9200	2100	0.57	0.16	59.0	54.1	22.4	20.7	C
Segment 18: Basic															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.935		4927		9200		0.54		59.9		20.5		C
Segment 19: Weaving															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.935		5375		10740		0.50		49.6		21.7		C
Segment 20: Diverge															
Time Period	**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**	**Freeway**	**Ramp**	
1	0.94	0.94	0.935	0.935	5018	922	9200	2100	0.55	0.44	59.3	60.0	20.9	20.9	C
Segment 21: Basic															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**

1	0.94	0.935	4096	6900	0.59	59.9	22.8	C

Facility Time Period Results

T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	54.4	25.0	23.4	7.00	F

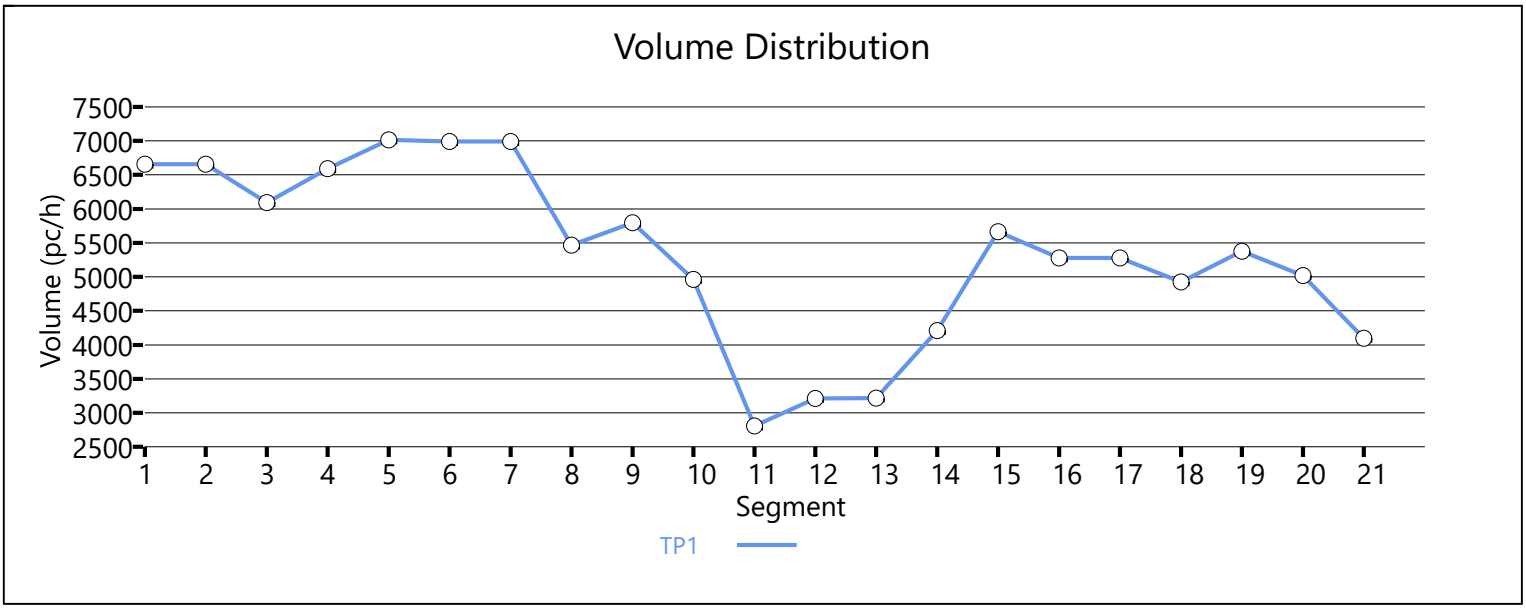
Facility Overall Results

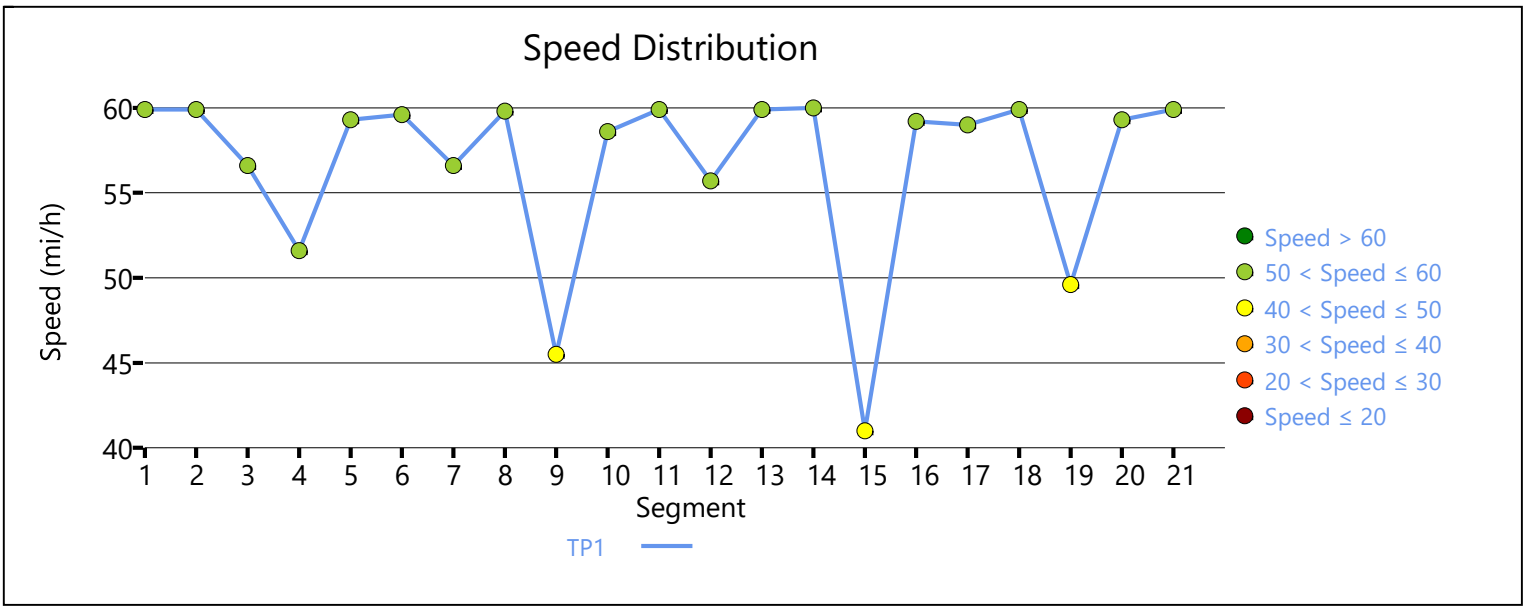
Space Mean Speed, mi/h	54.4	Density, veh/mi/ln	23.4
Average Travel Time, min	7.00	Density, pc/mi/ln	25.0

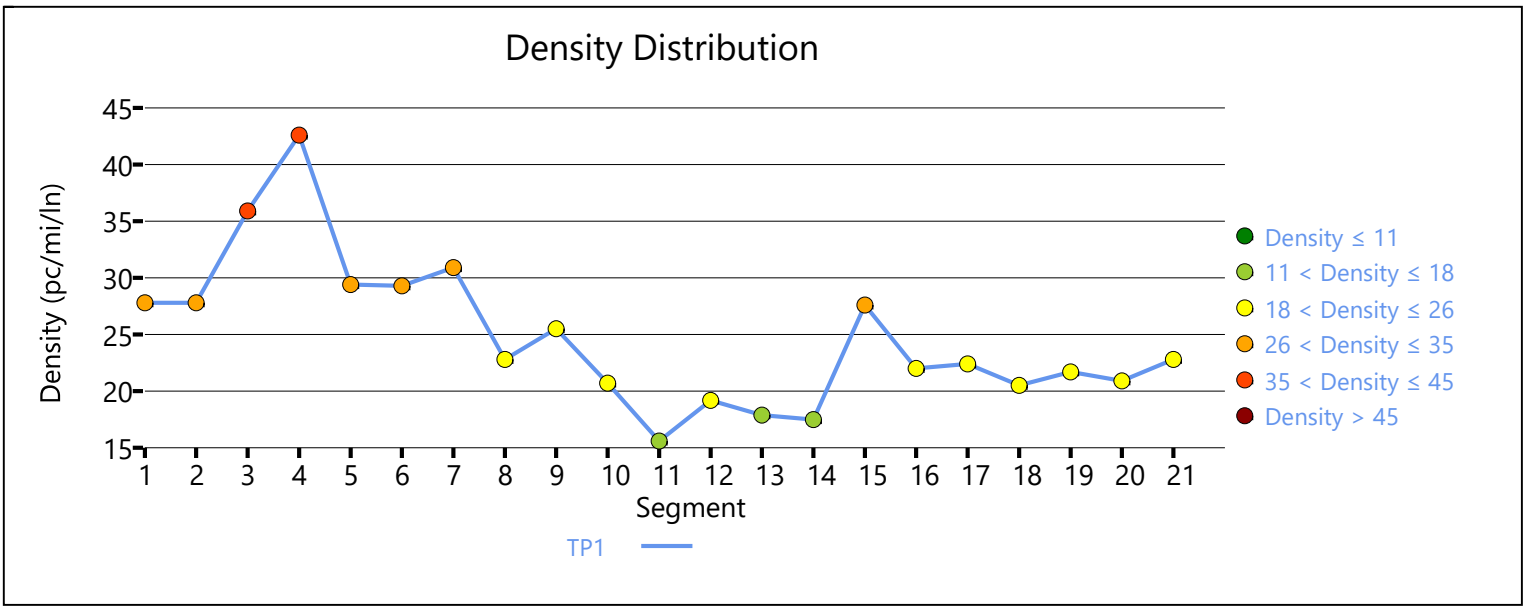
Messages

WARNING 1	Oversaturated conditions currently exist in boundary time period 1. Results may not be reliable. Consider expanding analysis in time and/or space to resolve this warning.
WARNING 2	Diverge capacity is less than diverge demand on segment 10. This may result in an off-ramp queue affecting the mainline flow. This is not currently modeled in HCM methodologies. Use caution when reviewing results.

Comments







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HCS7 Basic Freeway Report

Project Information

Analyst	MEL	Date	5/14/2020
Agency	Burgess & Niple	Analysis Year	2045 Full Build
Jurisdiction		Time Period Analyzed	AM Peak Southbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary
Segment Number	1	Segment Name	North of Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6020	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1664
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	27.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	2	Segment Name	Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6020	510
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.943
Flow Rate (vi),pc/h	6657	575
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.72	0.27

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	59.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	27.8
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	27.8

HCS7 Basic Freeway Report

Project Information			
Segment Number	3	Segment Name	North of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1620	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5510	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	2031
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.88
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	56.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	35.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	4	Segment Name	Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	770
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5510	430
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	9.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.917
Flow Rate (vi),pc/h	6093	499
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.96	0.24

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.499
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2443
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	51.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.599	Outer Lanes Freeway Speed (SO), mi/h	52.6
Flow in Lanes 1 and 2 (v12), pc/h	3650	Ramp Junction Speed (S), mi/h	51.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	4149	Average Density (D), pc/mi/ln	42.6
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	32.9

HCS7 Basic Freeway Report

Project Information

Segment Number	5	Segment Name	Glenwood On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5940	380
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	10.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.909
Flow Rate (vi),pc/h	6569	445
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.76	0.21

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	59.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	29.4
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	29.4

HCS7 Basic Freeway Report

Project Information			
Segment Number	6	Segment Name	Glenwood On to Perkins Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	770	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6320	Heavy Vehicle Adjustment Factor (f_{HV})	0.962
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1747
Total Trucks, %	4.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.76
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.6
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	29.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Diverge Report

Project Information

Segment Number	7	Segment Name	Perkins Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	340
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6320	1430
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	4.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.962	0.980
Flow Rate (vi),pc/h	6989	1552
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.76	0.74

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.438
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1533
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	52.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	63.7
Flow in Lanes 1 and 2 (v12), pc/h	3923	Ramp Junction Speed (S), mi/h	56.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	30.9
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	34.9

HCS7 Basic Freeway Report

Project Information			
Segment Number	8	Segment Name	North of Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1800	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4890	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1366
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.59
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	9	Segment Name	Perkins On to Butchel Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	460	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4150	290	30	740
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	2.00	2.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.952	0.980	0.980	0.971
Flow Rate (v_i), pc/h	4637	315	33	811

Weaving Flow Rate (v_W), pc/h	1126	Freeway Max Capacity (c_{IFL}), pc/h/ln	2300
Non-Weaving Flow Rate (v_{NW}), pc/h	4670	Density-Based Capacity (c_{IWL}), pc/h/ln	1993
Total Flow Rate (v), pc/h	5796	Demand Flow-Based Capacity (c_{IW}), pc/h	12371
Volume Ratio (VR)	0.194	Weaving Segment Capacity (c_W), veh/h	9530
Minimum Lane Change Rate (LC_{MIN}), lc/h	1126	Adjusted Weaving Area Capacity, pc/h	9965
Maximum Weaving Length (L_{MAX}), ft	4475	Volume-to-Capacity Ratio (v/c)	0.58

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	501	Average Weaving Speed (S_W), mi/h	42.6
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	248	Average Non-Weaving Speed (S_{NW}), mi/h	46.3
Weaving Lane Change Rate (LC_W), lc/h	1449	Average Speed (S), mi/h	45.5
Weaving Lane Change Rate (LC_{All}), lc/h	1697	Density (D), pc/mi/ln	25.5
Weaving Intensity Factor (W)	0.633	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information

Segment Number	10	Segment Name	I-76 Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1400	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4440	1930
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.971
Flow Rate (vi),pc/h	4962	2115
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.54	1.01

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	58.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	20.7
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	20.7

HCS7 Basic Freeway Report

Project Information			
Segment Number	11	Segment Name	North of Carroll On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1650	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	2510	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	935
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.41
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	15.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	12	Segment Name	Carroll On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	35.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2510	370
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.971
Flow Rate (vi),pc/h	2805	405
Capacity (c), pc/h	6900	2000
Volume-to-Capacity Ratio (v/c)	0.47	0.20

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.296
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1122
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	54.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	57.8
Flow in Lanes 1 and 2 (v12), pc/h	1683	Ramp Junction Speed (S), mi/h	55.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	2088	Average Density (D), pc/mi/ln	19.2
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	16.6

HCS7 Basic Freeway Report

Project Information			
Segment Number	13	Segment Name	North of EB I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2810	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	2880	Heavy Vehicle Adjustment Factor (f_{HV})	0.952
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1073
Total Trucks, %	5.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.47
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	17.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	14	Segment Name	EB I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	130	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2880	870
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.935
Flow Rate (vi),pc/h	3218	990
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.46	0.47

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	17.5
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.5

HCS7 Freeway Weaving Report

Project Information

Segment Number	15	Segment Name	I-76 On to Archwood Off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1780	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	3410	1230	70	340
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	7.00	7.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.952	0.935	0.935	0.971
Flow Rate (v_i), pc/h	3811	1399	80	373
Weaving Flow Rate (v_W), pc/h	1772	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	3891	Density-Based Capacity (c_{IWL}), pc/h/ln		1998
Total Flow Rate (v), pc/h	5663	Demand Flow-Based Capacity (c_{IW}), pc/h		7668
Volume Ratio (VR)	0.313	Weaving Segment Capacity (c_W), veh/h		7275
Minimum Lane Change Rate (LC_{MIN}), lc/h	2145	Adjusted Weaving Area Capacity, pc/h		7668
Maximum Weaving Length (L_{MAX}), ft	5724	Volume-to-Capacity Ratio (v/c)		0.74

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1501	Average Weaving Speed (S_W), mi/h	45.7
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1346	Average Non-Weaving Speed (S_{NW}), mi/h	39.1
Weaving Lane Change Rate (LC_W), lc/h	3088	Average Speed (S), mi/h	41.0
Weaving Lane Change Rate (LC_{All}), lc/h	4434	Density (D), pc/mi/ln	27.6
Weaving Intensity Factor (W)	0.464	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information			
Segment Number	16	Segment Name	North of Wilbreth Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	690	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4640	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1320
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.57
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.2
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Diverge Report

Project Information

Segment Number	17	Segment Name	Wilbreth Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	560
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4640	310
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	7.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.935	0.962
Flow Rate (vi),pc/h	5279	343
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.57	0.16

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.329
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1392
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	64.3
Flow in Lanes 1 and 2 (v12), pc/h	2495	Ramp Junction Speed (S), mi/h	59.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	22.4
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	20.7

HCS7 Basic Freeway Report

Project Information			
Segment Number	18	Segment Name	North of Wilbreth On-ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1430	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4330	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1232
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.54
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	20.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	19	Segment Name	Wilbreth on to Waterloo off
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1840	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.83	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4050	360	60	280
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	7.00	3.00	3.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.935	0.971	0.971	0.971
Flow Rate (v_i), pc/h	4608	394	66	307
Weaving Flow Rate (v_W), pc/h	701	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	4674	Density-Based Capacity (c_{IWL}), pc/h/ln		2148
Total Flow Rate (v), pc/h	5375	Demand Flow-Based Capacity (c_{IW}), pc/h		18462
Volume Ratio (VR)	0.130	Weaving Segment Capacity (c_W), veh/h		10097
Minimum Lane Change Rate (LC_{MIN}), lc/h	701	Adjusted Weaving Area Capacity, pc/h		10740
Maximum Weaving Length (L_{MAX}), ft	3833	Volume-to-Capacity Ratio (v/c)		0.50

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	1577	Average Weaving Speed (S_W), mi/h	48.1
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1736	Average Non-Weaving Speed (S_{NW}), mi/h	49.8
Weaving Lane Change Rate (LC_W), lc/h	1581	Average Speed (S), mi/h	49.6
Weaving Lane Change Rate (LC_{All}), lc/h	3317	Density (D), pc/mi/ln	21.7
Weaving Intensity Factor (W)	0.360	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information

Segment Number	20	Segment Name	277 WB Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	540	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4410	810
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	7.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.935	0.935
Flow Rate (vi),pc/h	5018	922
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.55	0.44

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	20.9
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	20.9

HCS7 Basic Freeway Report

Project Information

Segment Number	21	Segment Name	South of 277 WB Off-Ramp
Time Period Number	1	Segment Analysis Time Period	07:00-07:15

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3600	Heavy Vehicle Adjustment Factor (f_{HV})	0.935
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1365
Total Trucks, %	7.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.59
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

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I-77 Southbound

PM Full Build

HCS Facilities and Segment Output

HCS7 Freeway Facilities Report

Project Information

Analyst	MEL	Date	5/14/2020
Agency	Burgess & Niple	Analysis Year	2045 Full Build
Jurisdiction		Time Period Analyzed	PM Peak Southbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary

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	21
Total Time Periods	1	Time Period Duration, min	15
Facility Length, mi	6.31		

Facility Segment Data

No.	Coded	Analyzed	Name	Length, ft	Lanes
1	Basic	Basic	North of Tallmadge Off-Ramp	2000	4
2	Diverge	Basic	Tallmadge Off-Ramp	1500	4
3	Basic	Basic	North of Tallmadge On-Ramp	1620	3
4	Merge	Merge	Tallmadge On-Ramp	1500	3
5	Merge	Basic	Glenwood On-Ramp	1500	4
6	Basic	Basic	Glenwood On to Perkins Off	770	4
7	Diverge	Diverge	Perkins Off-Ramp	1500	4
8	Basic	Basic	North of Perkins On-Ramp	1800	4
9	Weaving	Weaving	Perkins On to Butchel Off	1460	5
10	Diverge	Basic	I-76 Off-Ramp	1400	4
11	Basic	Basic	North of Carroll On-Ramp	1650	3
12	Merge	Merge	Carroll On-Ramp	1500	3
13	Basic	Basic	North of EB I-76 On-Ramp	2810	3
14	Merge	Basic	EB I-76 On-Ramp	130	4
15	Weaving	Weaving	I-76 On to Archwood Off	3180	5
16	Basic	Basic	North of Wilbreth Off-Ramp	690	4
17	Diverge	Diverge	Wilbreth Off-Ramp	1500	4
18	Basic	Basic	North of Wilbreth On-ramp	1430	4
19	Weaving	Weaving	Wilbreth on to Waterloo off	2840	5
20	Diverge	Basic	277 WB Off-Ramp	540	4
21	Basic	Basic	South of 277 WB Off-Ramp	2000	3

Facility Segment Data

Segment 1: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5347	9200	0.58	60.0	22.3	C

Segment 2: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.962	5347	719	9200	2100	0.58	0.34	60.0	60.0	22.3	22.3	C

Segment 3: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	4634	6900	0.67	60.0	25.8	C

Segment 4: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.980	5122	488	6900	2100	0.74	0.23	54.1	53.6	31.6	26.0	C

Segment 5: Merge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.980	5594	467	9200	2100	0.61	0.22	59.5	60.0	23.3	23.3	C

Segment 6: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5599	9200	0.61	59.9	23.3	C

Segment 7: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.980	5599	445	9200	2100	0.61	0.21	58.8	53.9	23.8	24.3	C

Segment 8: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5149	9200	0.56	59.9	21.4	C

Segment 9: Weaving

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS
1	0.94	0.971	5859	9890	0.59	44.6	26.3	C

Segment 10: Diverge

Time Period	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	Freeway	Ramp	
1	0.94	0.94	0.971	0.971	5204	1665	9200	2100	0.57	0.79	58.5	60.0	21.7	21.7	C

Segment 11: Basic

Time Period	PHF	fHV	Flow Rate (pc/h)	Capacity (pc/h)	d/c Ratio	Speed (mi/h)	Density (pc/mi/ln)	LOS

1	0.94		0.971		3539		6900		0.51		59.9		19.7		C
Segment 12: Merge															
Time Period	**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**	**Freeway**	**Ramp**	
1	0.94	0.94	0.971	0.971	4437	898	6900	2000	0.64	0.45	54.7	53.8	27.0	23.7	C
Segment 13: Basic															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.971		4437		6900		0.64		59.8		24.6		C
Segment 14: Merge															
Time Period	**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**	**Freeway**	**Ramp**	
1	0.94	0.94	0.971	0.962	6118	1681	9200	2100	0.67	0.80	60.0	60.0	25.5	25.5	C
Segment 15: Weaving															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.971		7581		10330		0.73		38.9		39.0		E
Segment 16: Basic															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.971		7154		9200		0.78		59.1		30.1		D
Segment 17: Diverge															
Time Period	**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**	**Freeway**	**Ramp**	
1	0.94	0.94	0.971	0.962	7154	409	9200	2100	0.78	0.19	58.1	54.0	30.8	28.0	C
Segment 18: Basic															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.971		6749		9200		0.73		59.8		28.2		D
Segment 19: Weaving															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**
1	0.94		0.971		7463		10775		0.69		46.3		32.2		D
Segment 20: Diverge															
Time Period	**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**	**Freeway**	**Ramp**	
1	0.94	0.94	0.971	0.943	7067	1342	9200	2100	0.77	0.64	59.1	59.5	29.7	29.7	D
Segment 21: Basic															
Time Period	**PHF**		**fHV**		**Flow Rate (pc/h)**		**Capacity (pc/h)**		**d/c Ratio**		**Speed (mi/h)**		**Density (pc/mi/ln)**		**LOS**

1	0.94	0.971	5763	6900	0.84	58.1	33.1	D

Facility Time Period Results

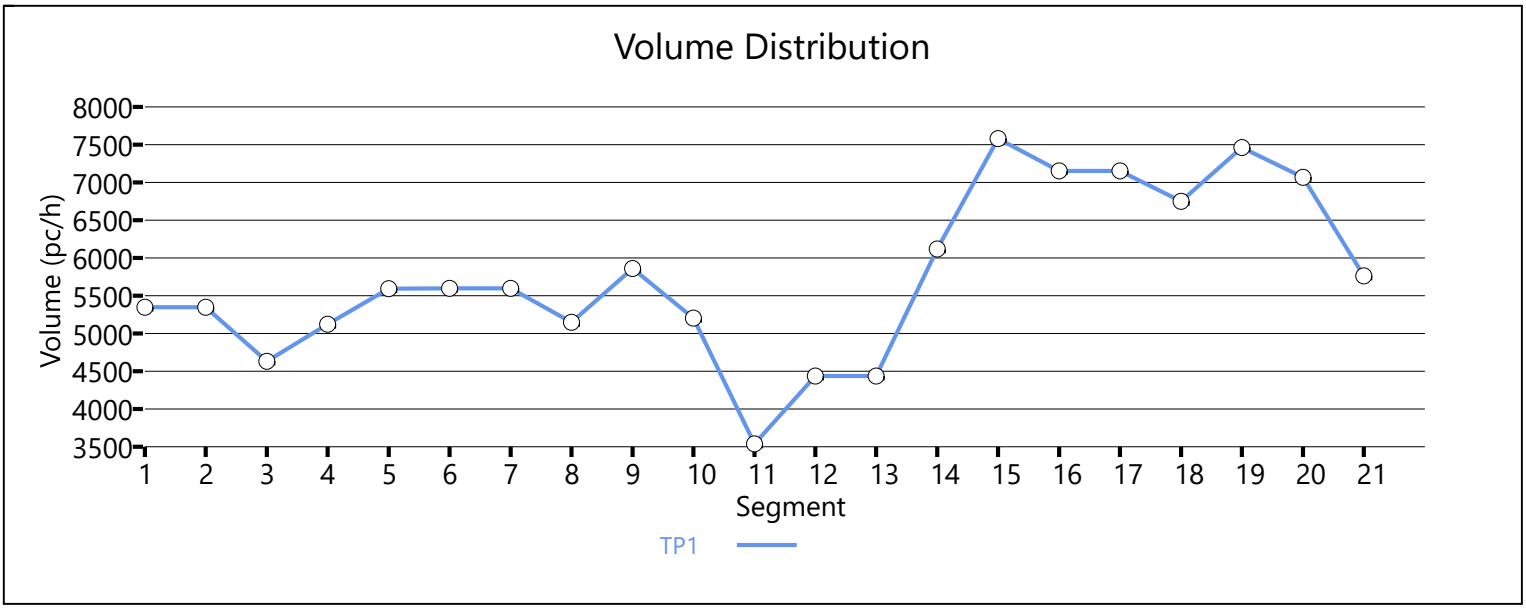
T	Speed, mi/h	Density, pc/mi/ln	Density, veh/mi/ln	Travel Time, min	LOS
1	53.0	27.8	26.5	7.10	D

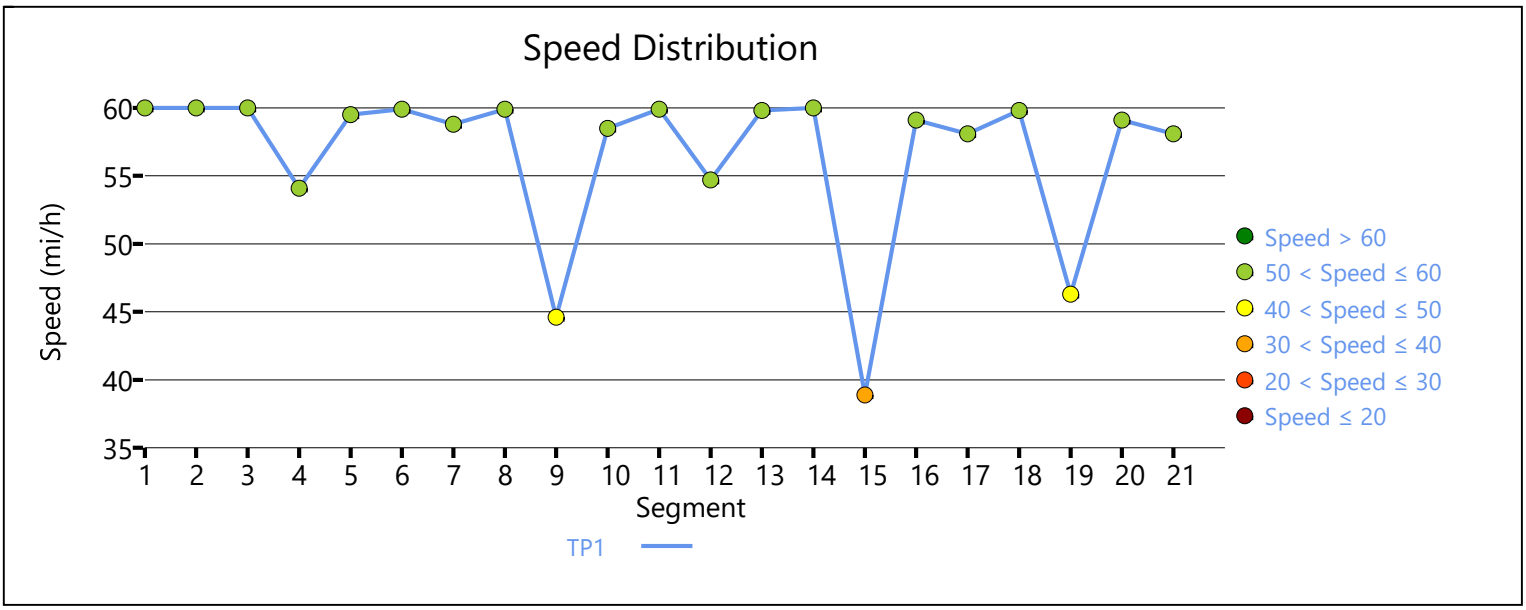
Facility Overall Results

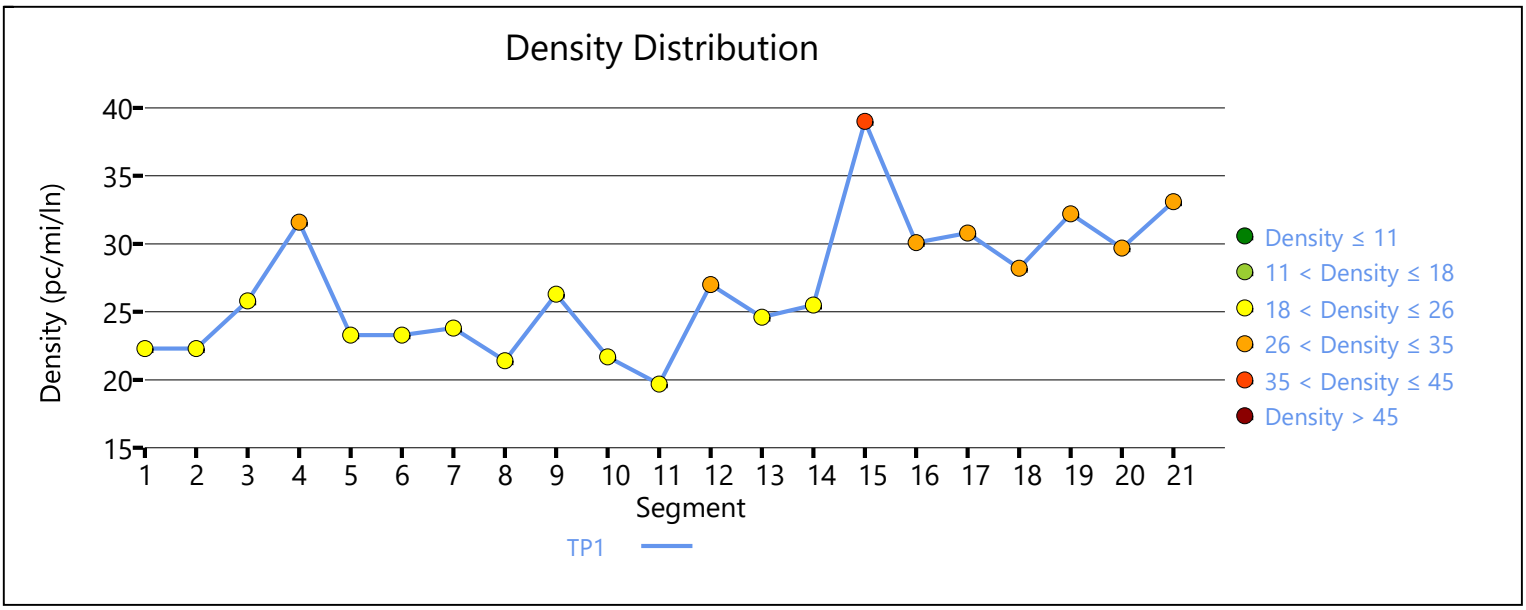
Space Mean Speed, mi/h	53.0	Density, veh/mi/ln	26.5
Average Travel Time, min	7.10	Density, pc/mi/ln	27.8

Messages

Comments







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HCS7 Basic Freeway Report

Project Information			
Analyst	MEL	Date	5/14/2020
Agency	Burgess & Niple	Analysis Year	2045 Full Build
Jurisdiction		Time Period Analyzed	PM Peak Southbound
Project Description	SUM-8 Corridor Study	Unit	United States Customary
Segment Number	1	Segment Name	North of Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity			
Demand Volume veh/h	4880	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1337
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.58
Passenger Car Equivalent (E_T)	2.000		

Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	60.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	22.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	2	Segment Name	Tallmadge Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4880	650
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	5347	719
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.58	0.34

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	22.3
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	22.3

HCS7 Basic Freeway Report

Project Information			
Segment Number	3	Segment Name	North of Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1620	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4230	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1545
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	60.0
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	25.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	4	Segment Name	Tallmadge On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	770
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4230	450
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.980
Flow Rate (vi),pc/h	4634	488
Capacity (c), pc/h	6900	2100
Volume-to-Capacity Ratio (v/c)	0.74	0.23

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.354
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1858
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	53.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.599	Outer Lanes Freeway Speed (SO), mi/h	55.1
Flow in Lanes 1 and 2 (v12), pc/h	2776	Ramp Junction Speed (S), mi/h	54.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	3264	Average Density (D), pc/mi/ln	31.6
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	26.0

HCS7 Basic Freeway Report

Project Information

Segment Number	5	Segment Name	Glenwood On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4680	430
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.980
Flow Rate (vi),pc/h	5127	467
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.61	0.22

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	23.3
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	23.3

HCS7 Basic Freeway Report

Project Information			
Segment Number	6	Segment Name	Glenwood On to Perkins Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	770	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5110	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1400
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.61
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	23.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Diverge Report

Project Information

Segment Number	7	Segment Name	Perkins Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	340
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5110	410
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	2.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.980
Flow Rate (vi),pc/h	5599	445
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.61	0.21

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.338
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1454
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	53.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	64.1
Flow in Lanes 1 and 2 (v12), pc/h	2692	Ramp Junction Speed (S), mi/h	58.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	23.8
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	24.3

HCS7 Basic Freeway Report

Project Information			
Segment Number	8	Segment Name	North of Perkins On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1800	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4700	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1287
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.56
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	21.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	9	Segment Name	Perkins On to Butchel Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	460	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.33	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4150	600	60	550
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	1.00	1.00	3.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.990	0.990	0.971
Flow Rate (v_i), pc/h	4547	645	64	603
Weaving Flow Rate (v_W), pc/h	1248	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	4611	Density-Based Capacity (c_{IWL}), pc/h/ln		1978
Total Flow Rate (v), pc/h	5859	Demand Flow-Based Capacity (c_{IW}), pc/h		11268
Volume Ratio (VR)	0.213	Weaving Segment Capacity (c_W), veh/h		9626
Minimum Lane Change Rate (LC_{MIN}), lc/h	1248	Adjusted Weaving Area Capacity, pc/h		9890
Maximum Weaving Length (L_{MAX}), ft	4670	Volume-to-Capacity Ratio (v/c)		0.59

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	495	Average Weaving Speed (S_W), mi/h	42.0
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	236	Average Non-Weaving Speed (S_{NW}), mi/h	45.4
Weaving Lane Change Rate (LC_W), lc/h	1571	Average Speed (S), mi/h	44.6
Weaving Lane Change Rate (LC_{All}), lc/h	1807	Density (D), pc/mi/ln	26.3
Weaving Intensity Factor (W)	0.665	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information

Segment Number	10	Segment Name	I-76 Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1400	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4750	1520
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.971
Flow Rate (vi),pc/h	5204	1665
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.57	0.79

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	58.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	21.7
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	21.7

HCS7 Basic Freeway Report

Project Information			
Segment Number	11	Segment Name	North of Carroll On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	1650	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.50
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3230	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1180
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.51
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.9
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	19.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Merge Report

Project Information

Segment Number	12	Segment Name	Carroll On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	60.0	35.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	3230	820
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.971
Flow Rate (vi),pc/h	3539	898
Capacity (c), pc/h	6900	2000
Volume-to-Capacity Ratio (v/c)	0.64	0.45

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.345
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1416
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	53.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	56.7
Flow in Lanes 1 and 2 (v12), pc/h	2123	Ramp Junction Speed (S), mi/h	54.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	3021	Average Density (D), pc/mi/ln	27.0
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	23.7

HCS7 Basic Freeway Report

Project Information			
Segment Number	13	Segment Name	North of EB I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2810	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4050	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1479
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.64
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	24.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Basic Freeway Report

Project Information

Segment Number	14	Segment Name	EB I-76 On-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	130	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4050	1520
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	4437	1681
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.67	0.80

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	60.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	25.5
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	25.5

HCS7 Freeway Weaving Report

Project Information

Segment Number	15	Segment Name	I-76 On to Archwood Off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1780	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	2
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	2.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5260	1270	70	310
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	4.00	4.00	2.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.962	0.962	0.980
Flow Rate (v_i), pc/h	5763	1404	77	337
Weaving Flow Rate (v_W), pc/h	1741	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	5840	Density-Based Capacity (c_{IWL}), pc/h/ln		2066
Total Flow Rate (v), pc/h	7581	Demand Flow-Based Capacity (c_{IW}), pc/h		10435
Volume Ratio (VR)	0.230	Weaving Segment Capacity (c_W), veh/h		10016
Minimum Lane Change Rate (LC_{MIN}), lc/h	2078	Adjusted Weaving Area Capacity, pc/h		10330
Maximum Weaving Length (L_{MAX}), ft	4845	Volume-to-Capacity Ratio (v/c)		0.73

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	2252	Average Weaving Speed (S_W), mi/h	43.3
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	2991	Average Non-Weaving Speed (S_{NW}), mi/h	37.8
Weaving Lane Change Rate (LC_W), lc/h	3021	Average Speed (S), mi/h	38.9
Weaving Lane Change Rate (LC_{All}), lc/h	6012	Density (D), pc/mi/ln	39.0
Weaving Intensity Factor (W)	0.590	Level of Service (LOS)	E

HCS7 Basic Freeway Report

Project Information			
Segment Number	16	Segment Name	North of Wilbreth Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	690	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	2.00
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6530	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1788
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.78
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	30.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Diverge Report

Project Information

Segment Number	17	Segment Name	Wilbreth Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	560
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6530	370
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	4.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.962
Flow Rate (vi),pc/h	7154	409
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.78	0.19

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	2
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.335
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1902
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	62.3
Flow in Lanes 1 and 2 (v12), pc/h	3350	Ramp Junction Speed (S), mi/h	58.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	30.8
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	28.0

HCS7 Basic Freeway Report

Project Information			
Segment Number	18	Segment Name	North of Wilbreth On-ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15
Geometric Data			
Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	1430	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.83
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6160	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1687
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.73
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	59.8
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	28.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

HCS7 Freeway Weaving Report

Project Information

Segment Number	19	Segment Name	Wilbreth on to Waterloo off
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes (N), ln	5	Segment Type	Freeway
Segment Length (L_S), ft	1840	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	1.83	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5890	560	110	270
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	3.00	1.00	1.00	1.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.990	0.990	0.990
Flow Rate (v_i), pc/h	6453	602	118	290
Weaving Flow Rate (v_W), pc/h	892	Freeway Max Capacity (c_{IFL}), pc/h/ln		2300
Non-Weaving Flow Rate (v_{NW}), pc/h	6571	Density-Based Capacity (c_{IWL}), pc/h/ln		2155
Total Flow Rate (v), pc/h	7463	Demand Flow-Based Capacity (c_{IW}), pc/h		20000
Volume Ratio (VR)	0.120	Weaving Segment Capacity (c_W), veh/h		10490
Minimum Lane Change Rate (LC_{MIN}), lc/h	892	Adjusted Weaving Area Capacity, pc/h		10775
Maximum Weaving Length (L_{MAX}), ft	3735	Volume-to-Capacity Ratio (v/c)		0.69

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	2217	Average Weaving Speed (S_W), mi/h	45.2
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	3154	Average Non-Weaving Speed (S_{NW}), mi/h	46.4
Weaving Lane Change Rate (LC_W), lc/h	1772	Average Speed (S), mi/h	46.3
Weaving Lane Change Rate (LC_{All}), lc/h	4926	Density (D), pc/mi/ln	32.2
Weaving Intensity Factor (W)	0.492	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information

Segment Number	20	Segment Name	277 WB Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	60.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	540	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6450	1190
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	3.00	6.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.943
Flow Rate (vi),pc/h	7067	1342
Capacity (c), pc/h	9200	2100
Volume-to-Capacity Ratio (v/c)	0.77	0.64

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	9999.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	55.000
Downstream Equilibrium Distance (LEQ), ft	9999.0	Flow Outer Lanes (vOA), pc/h/ln	0
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	59.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	75.0
Flow in Lanes 1 and 2 (v12), pc/h	0	Ramp Junction Speed (S), mi/h	59.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	0	Average Density (D), pc/mi/ln	29.7
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	29.7

HCS7 Basic Freeway Report

Project Information

Segment Number	21	Segment Name	South of 277 WB Off-Ramp
Time Period Number	1	Segment Analysis Time Period	17:00-17:15

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	2000	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	1.33
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	60.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5260	Heavy Vehicle Adjustment Factor (f_{HV})	0.971
Peak Hour Factor	0.94	Flow Rate (V_p), pc/h/ln	1921
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2300
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2300
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.84
Passenger Car Equivalent (E_T)	2.000		

Speed and Density

Lane Width Adjustment (f_{LW})	-	Average Speed (S), mi/h	58.1
Right-Side Lateral Clearance Adj. (f_{RLC})	-	Density (D), pc/mi/ln	33.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	60.0		

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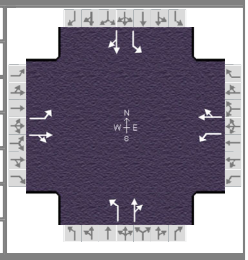
Appendix H

Intersection Capacity Analysis

HCS7 Signalized Intersection Results Summary

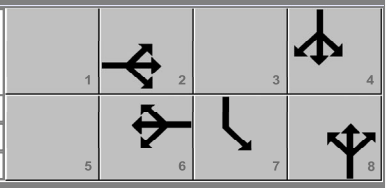
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	MEL	Analysis Date	May 22, 2020	Area Type	Other
Jurisdiction		Time Period	No-Build AM Peak	PHF	0.92
Urban Street	Carroll Street	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Spicer Street	File Name	Intersections - No-Build AM.xus		
Project Description	SUM-8-0.00 Corridor Study				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	10	10	10	150	70	120	40	110	30	10	140	50

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	59.0	11.0	32.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		6.0		6.0		6.3	1.0	4.0
Phase Duration, s		65.0		65.0		38.0	17.0	55.0
Change Period, ($Y+R_c$), s		6.0		6.0		6.0	6.0	6.0
Max Allow Headway (MAH), s		0.0		0.0		3.2	3.2	3.2
Queue Clearance Time (g_s), s						10.3	2.5	11.2
Green Extension Time (g_e), s		0.0		0.0		0.8	0.0	0.8
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	11	22		177	225		43	152		11	207	
Adjusted Saturation Flow Rate (s), veh/h/ln	1046	1553		1401	1693		1147	1758		1795	1800	
Queue Service Time (g_s), s	0.8	0.9		14.5	14.9		3.5	8.3		0.5	9.2	
Cycle Queue Clearance Time (g_c), s	15.7	0.9		15.1	14.9		3.5	8.3		0.5	9.2	
Green Ratio (g/C)	0.49	0.49		0.49	0.49		0.27	0.27		0.38	0.41	
Capacity (c), veh/h	444	763		739	832		366	469		470	735	
Volume-to-Capacity Ratio (X)	0.024	0.028		0.240	0.270		0.119	0.325		0.023	0.281	
Back of Queue (Q), ft/ln (95 th percentile)	10.6	16.2		232	279.7		45.9	168.9		8.9	178.7	
Back of Queue (Q), veh/ln (95 th percentile)	0.4	0.6		9.2	11.1		1.8	6.5		0.4	7.1	
Queue Storage Ratio (RQ) (95 th percentile)	0.14	0.04		0.77	0.93		0.76	0.61		0.12	0.47	
Uniform Delay (d_1), s/veh	24.3	15.7		35.4	34.8		33.5	35.3		24.0	23.7	
Incremental Delay (d_2), s/veh	0.1	0.1		0.7	0.7		0.1	0.1		0.0	0.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	24.4	15.8		36.1	35.4		33.6	35.5		24.0	23.8	
Level of Service (LOS)	C	B		D	D		C	D		C	C	
Approach Delay, s/veh / LOS	18.7	B		35.7	D		35.1	D		23.8	C	
Intersection Delay, s/veh / LOS	31.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	1.91	B	1.94	B	1.92	B
Bicycle LOS Score / LOS	0.54	A	1.10	A	0.81	A	0.85	A

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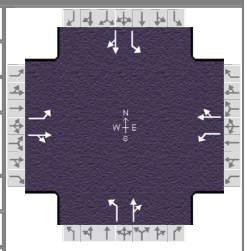
HCS7 Signalized Intersection Results Summary

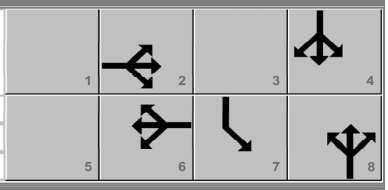
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	MEL	Analysis Date	May 22, 2020	Area Type	Other
Jurisdiction		Time Period	No-Build PM Peak	PHF	0.92
Urban Street	Carroll Street	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Spicer Street	File Name	Intersections - No-Build PM.xus		
Project Description	SUM-8-0.00 Corridor Study				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	60	50	100	40	70	10	190	100	100	240	20

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	0.0	0.0	0.0	0.0	0.0	0.0
Red	0.0	0.0	0.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8	7	4
Case Number		6.0		6.0		6.3	1.0	4.0
Phase Duration, s		61.0		61.0		42.0	17.0	59.0
Change Period, ($Y+R_c$), s		6.0		6.0		6.0	6.0	6.0
Max Allow Headway (*MAH*), s		0.0		0.0		0.0	0.0	0.0
Queue Clearance Time (g_s), s		0.0		0.0		0.0	0.0	0.0
Green Extension Time (g_e), s		0.0		0.0		0.0	0.0	0.0
Phase Call Probability		0.00		0.00		0.00	0.00	0.00
Max Out Probability		0.00		0.00		0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	0	0		0	0		0	0		0	0	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	0	0		0	0		0	0		0	0	
Queue Service Time (g_s), s	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Cycle Queue Clearance Time (g_c), s	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Green Ratio (*g/C*)	0.46	0.46		0.46	0.46		0.30	0.30		0.41	0.44	
Capacity (*c*), veh/h	559	786		591	769		389	528		383	821	
Volume-to-Capacity Ratio (*X*)	0.097	0.152		0.175	0.148		0.028	0.597		0.284	0.344	
Back of Queue (*Q*), ft/ln (95 th percentile)	47.8	93.8		154.9	160.1		10.3	322.2		88.6	227.2	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.9	3.7		6.1	6.3		0.4	12.7		3.5	9.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.64	0.23		0.52	0.53		0.17	1.17		1.18	0.60	
Uniform Delay (d_1), s/veh	23.0	18.9		39.9	34.4		29.7	35.8		24.3	22.1	
Incremental Delay (d_2), s/veh	0.3	0.4		0.6	0.4		0.0	1.3		0.1	0.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	23.4	19.3		40.6	34.8		29.7	37.1		24.4	22.1	
Level of Service (LOS)	C	B		D	C		C	D		C	C	
Approach Delay, s/veh / LOS	20.6	C		37.5	D		36.9	D		22.8	C	
Intersection Delay, s/veh / LOS	29.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	1.91	B	1.93	B	1.91	B
Bicycle LOS Score / LOS	0.77	A	0.86	A	1.03	A	1.13	A

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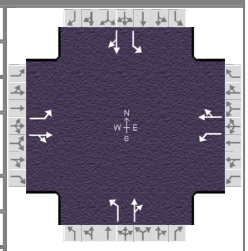
HCS7 Signalized Intersection Results Summary

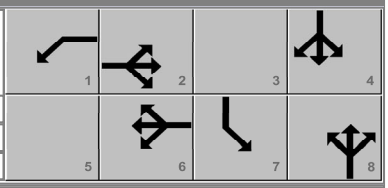
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	MEL	Analysis Date	May 22, 2020	Area Type	Other
Jurisdiction		Time Period	Full Build AM Peak	PHF	0.92
Urban Street	Carroll Street	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Spicer Street	File Name	Intersections - Full-Build AM.xus		
Project Description	SUM-8-0.00 Corridor Study				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	10	10	490	70	120	40	110	30	10	240	50

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	29.0	32.0	8.0	27.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8	7	4
Case Number		6.3	1.0	4.0		6.3	1.0	4.0
Phase Duration, s		38.0	35.0	73.0		33.0	14.0	47.0
Change Period, ($Y+R_c$), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Allow Headway (*MAH*), s		0.0	3.2	0.0		3.2	3.2	3.2
Queue Clearance Time (g_s), s			26.0			10.8	2.5	18.5
Green Extension Time (g_e), s		0.0	0.4	0.0		1.0	0.0	1.0
Phase Call Probability			1.00			1.00	1.00	1.00
Max Out Probability			1.00			0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	21	41		533	207		43	152		11	315	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1064	1553		1795	1693		1039	1758		1795	1828	
Queue Service Time (g_s), s	2.1	2.5		24.0	7.4		4.2	8.8		0.5	16.5	
Cycle Queue Clearance Time (g_c), s	2.1	2.5		24.0	7.4		6.6	8.8		0.5	16.5	
Green Ratio (*g/C*)	0.27	0.27		0.52	0.56		0.22	0.22		0.31	0.34	
Capacity (*c*), veh/h	344	414		832	945		273	396		368	625	
Volume-to-Capacity Ratio (*X*)	0.060	0.099		0.640	0.219		0.160	0.385		0.030	0.505	
Back of Queue (*Q*), ft/ln (95 th percentile)	28.8	51.2		384.2	132.5		50.5	180		10	295.5	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.0	1.8		15.2	5.3		1.9	6.9		0.4	11.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.38	0.13		1.28	0.44		0.84	0.65		0.13	0.78	
Uniform Delay (d_1), s/veh	39.7	35.4		19.4	13.3		39.6	39.5		29.4	31.4	
Incremental Delay (d_2), s/veh	0.3	0.5		1.3	0.5		0.1	0.2		0.0	0.3	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	40.0	35.8		20.7	13.9		39.7	39.7		29.4	31.7	
Level of Service (LOS)	D	D		C	B		D	D		C	C	
Approach Delay, s/veh / LOS	37.2	D		18.8	B		39.7	D		31.6	C	
Intersection Delay, s/veh / LOS	25.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.94	B	1.90	B	1.94	B	1.93	B
Bicycle LOS Score / LOS	0.54	A	1.71	B	0.81	A	1.03	A

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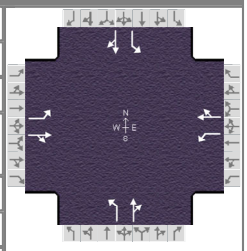
HCS7 Signalized Intersection Results Summary

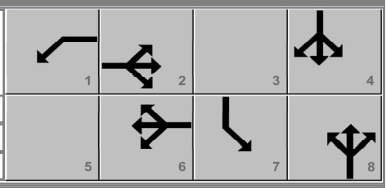
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	MEL	Analysis Date	May 22, 2020	Area Type	Other
Jurisdiction		Time Period	Full Build PM Peak	PHF	0.92
Urban Street	Carroll Street	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Spicer Street	File Name	Intersections - Full-Build PM.xus		
Project Description	SUM-8-0.00 Corridor Study				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	60	50	500	40	70	10	190	100	100	340	20

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	29.0	24.0	8.0	35.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8	7	4
Case Number		6.3	1.0	4.0		6.3	1.0	4.0
Phase Duration, s		30.0	35.0	65.0		41.0	14.0	55.0
Change Period, ($Y+R_c$), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Allow Headway (*MAH*), s		0.0	3.2	0.0		3.2	3.2	3.2
Queue Clearance Time (g_s), s			31.0			20.5	6.8	20.8
Green Extension Time (g_e), s		0.0	0.0	0.0		1.4	0.0	1.5
Phase Call Probability			1.00			1.00	1.00	1.00
Max Out Probability			1.00			0.01	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	54	120		624	137		11	315		109	391	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1242	1715		1781	1678		993	1761		1795	1867	
Queue Service Time (g_s), s	4.4	7.2		29.0	5.5		1.0	18.5		4.8	18.8	
Cycle Queue Clearance Time (g_c), s	4.4	7.2		29.0	5.5		5.8	18.5		4.8	18.8	
Green Ratio (*g/C*)	0.20	0.20		0.46	0.49		0.29	0.29		0.38	0.41	
Capacity (*c*), veh/h	308	343		669	825		310	514		327	762	
Volume-to-Capacity Ratio (*X*)	0.176	0.349		0.933	0.166		0.035	0.614		0.332	0.513	
Back of Queue (*Q*), ft/ln (95 th percentile)	67.2	153		274.1	101.1		11.2	326.9		94.7	330.9	
Back of Queue (*Q*), veh/ln (95 th percentile)	2.6	6.0		10.8	4.0		0.4	12.9		3.8	13.1	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.90	0.38		0.91	0.34		0.19	1.19		1.26	0.87	
Uniform Delay (d_1), s/veh	40.2	41.3		27.9	17.2		34.0	36.7		26.9	26.6	
Incremental Delay (d_2), s/veh	1.2	2.8		16.6	0.3		0.0	1.6		0.2	0.3	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	41.4	44.1		44.6	17.5		34.0	38.3		27.1	26.8	
Level of Service (LOS)	D	D		D	B		C	D		C	C	
Approach Delay, s/veh / LOS	43.2	D		39.7	D		38.1	D		26.9	C	
Intersection Delay, s/veh / LOS	36.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.94	B	1.91	B	1.93	B	1.92	B
Bicycle LOS Score / LOS	0.77	A	1.58	B	1.03	A	1.31	A

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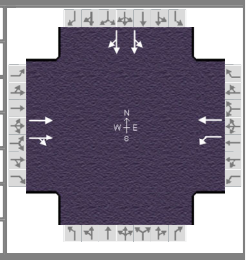
HCS7 Signalized Intersection Results Summary

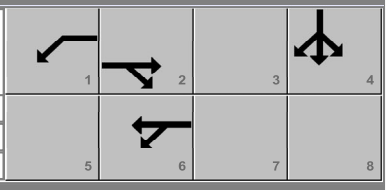
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	MEL	Analysis Date	May 22, 2020	Area Type	Other
Jurisdiction		Time Period	No-Build AM Peak	PHF	0.92
Urban Street	Carroll Street	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Goodkirk Street	File Name	Intersections - No-Build AM.xus		
Project Description	SUM-8-0.00 Corridor Study				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		10	50	220	350					30	730	20

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	50	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.0	35.0	59.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6				4
Case Number		8.3	1.0	4.0				12.0
Phase Duration, s		41.0	14.0	55.0				65.0
Change Period, ($Y+R_c$), s		6.0	6.0	6.0				6.0
Max Allow Headway (*MAH*), s		0.0	3.2	0.0				3.1
Queue Clearance Time (g_s), s			10.0					21.8
Green Extension Time (g_e), s		0.0	0.0	0.0				1.7
Phase Call Probability			1.00					1.00
Max Out Probability			1.00					0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					7	4	14
Adjusted Flow Rate (*v*), veh/h		9	45	239	380					445		403
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1752	1485	1767	1856					1819		1808
Queue Service Time (g_s), s		0.5	1.3	8.0	8.3					19.8		17.5
Cycle Queue Clearance Time (g_c), s		0.5	1.3	8.0	8.3					19.8		17.5
Green Ratio (*g/C*)		0.29	0.29	0.38	0.41					0.49		0.49
Capacity (*c*), veh/h		511	433	554	758					894		889
Volume-to-Capacity Ratio (*X*)		0.018	0.105	0.432	0.502					0.498		0.453
Back of Queue (*Q*), ft/ln (95 th percentile)		3.1	22.2	77.9	127.3					326		293.4
Back of Queue (*Q*), veh/ln (95 th percentile)		0.1	0.9	3.0	5.0					13.0		11.7
Queue Storage Ratio (*RQ*) (95 th percentile)		0.01	0.08	0.35	0.57					0.90		0.81
Uniform Delay (d_1), s/veh		8.7	14.0	28.9	8.0					20.5		19.9
Incremental Delay (d_2), s/veh		0.1	0.5	2.0	1.9					0.2		0.1
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0					0.0		0.0
Control Delay (*d*), s/veh		8.8	14.5	30.9	10.0					20.7		20.1
Level of Service (LOS)		A	B	C	A					C		C
Approach Delay, s/veh / LOS	13.5	B		18.0	B		0.0			20.4	C	
Intersection Delay, s/veh / LOS	19.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.71	B	1.69	B	2.16	B	1.97	B
Bicycle LOS Score / LOS	0.54	A	1.51	B			1.19	A

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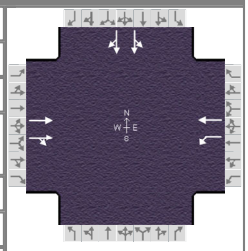
HCS7 Signalized Intersection Results Summary

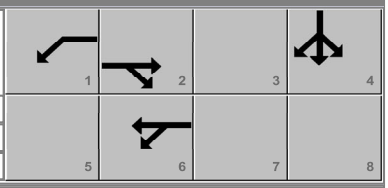
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	MEL	Analysis Date	May 22, 2020	Area Type	Other
Jurisdiction		Time Period	No-Build PM Peak	PHF	0.92
Urban Street	Carroll Street	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Goodkirk Street	File Name	Intersections - No-Build PM.xus		
Project Description	SUM-8-0.00 Corridor Study				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		60	240	230	190					20	1170	10

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	50	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.0	35.0	59.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6				4
Case Number		8.3	1.0	4.0				12.0
Phase Duration, s		41.0	14.0	55.0				65.0
Change Period, ($Y+R_c$), s		6.0	6.0	6.0				6.0
Max Allow Headway (*MAH*), s		0.0	3.2	0.0				3.1
Queue Clearance Time (g_s), s			10.0					37.2
Green Extension Time (g_e), s		0.0	0.0	0.0				2.9
Phase Call Probability			1.00					1.00
Max Out Probability			1.00					0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					7	4	14
Adjusted Flow Rate (*v*), veh/h		57	226	250	207					683		621
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1870	1585	1781	1870					1867		1864
Queue Service Time (g_s), s		3.1	10.2	8.0	2.9					35.2		30.5
Cycle Queue Clearance Time (g_c), s		3.1	10.2	8.0	2.9					35.2		30.5
Green Ratio (*g/C*)		0.29	0.29	0.38	0.41					0.49		0.49
Capacity (*c*), veh/h		546	462	406	764					918		917
Volume-to-Capacity Ratio (*X*)		0.104	0.489	0.616	0.270					0.744		0.677
Back of Queue (*Q*), ft/ln (95 th percentile)		30.6	159.2	140.5	54.5					561		488.1
Back of Queue (*Q*), veh/ln (95 th percentile)		1.2	6.4	5.5	2.1					22.4		19.5
Queue Storage Ratio (*RQ*) (95 th percentile)		0.10	0.54	0.62	0.24					1.52		1.32
Uniform Delay (d_1), s/veh		15.9	20.4	32.8	6.3					24.5		23.2
Incremental Delay (d_2), s/veh		0.4	3.4	6.1	0.8					2.9		1.7
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0					0.0		0.0
Control Delay (*d*), s/veh		16.2	23.8	38.9	7.0					27.4		24.9
Level of Service (LOS)		B	C	D	A					C		C
Approach Delay, s/veh / LOS	22.3	C		24.5	C		0.0			26.2	C	
Intersection Delay, s/veh / LOS	25.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.71	B	1.69	B	2.16	B	1.97	B
Bicycle LOS Score / LOS	0.76	A	1.24	A			1.56	B

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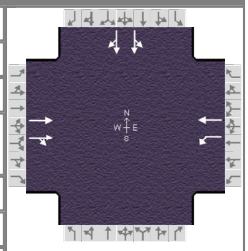
HCS7 Signalized Intersection Results Summary

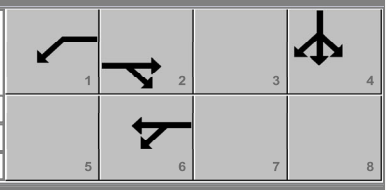
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	MEL	Analysis Date	May 22, 2020	Area Type	Other
Jurisdiction		Time Period	Full Build AM Peak	PHF	0.92
Urban Street	Carroll Street	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Goodkirk Street	File Name	Intersections - Full-Build AM.xus		
Project Description	SUM-8-0.00 Corridor Study				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		10	50	160	410					30	450	300

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	50	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.0	34.0	60.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6				4
Case Number		8.3	1.0	4.0				12.0
Phase Duration, s		40.0	14.0	54.0				66.0
Change Period, ($Y+R_c$), s		6.0	6.0	6.0				6.0
Max Allow Headway (*MAH*), s		0.0	3.2	0.0				3.2
Queue Clearance Time (g_s), s			4.2					23.1
Green Extension Time (g_e), s		0.0	0.0	0.0				1.9
Phase Call Probability			1.00					1.00
Max Out Probability			0.34					0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					7	4	14
Adjusted Flow Rate (*v*), veh/h		29	145	49	125					473		374
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1752	1485	1767	1856					1820		1578
Queue Service Time (g_s), s		0.5	5.0	2.2	4.4					21.1		18.7
Cycle Queue Clearance Time (g_c), s		0.5	5.0	2.2	4.4					21.1		18.7
Green Ratio (*g/C*)		0.28	0.28	0.37	0.40					0.50		0.50
Capacity (*c*), veh/h		496	421	468	742					910		789
Volume-to-Capacity Ratio (*X*)		0.058	0.345	0.104	0.169					0.520		0.474
Back of Queue (*Q*), ft/ln (95 th percentile)		10.6	75.1	44.9	90.8					344		276.8
Back of Queue (*Q*), veh/ln (95 th percentile)		0.4	3.0	1.8	3.5					13.8		11.1
Queue Storage Ratio (*RQ*) (95 th percentile)		0.04	0.28	0.20	0.40					0.95		0.77
Uniform Delay (d_1), s/veh		9.8	15.0	25.1	19.0					20.3		19.7
Incremental Delay (d_2), s/veh		0.2	1.8	0.4	0.5					0.3		0.2
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0					0.0		0.0
Control Delay (*d*), s/veh		10.0	16.7	25.6	19.4					20.5		19.8
Level of Service (LOS)		B	B	C	B					C		B
Approach Delay, s/veh / LOS	15.6	B		21.1	C		0.0			20.2	C	
Intersection Delay, s/veh / LOS	19.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.71	B	1.70	B	2.16	B	1.97	B
Bicycle LOS Score / LOS	0.54	A	1.51	B			1.19	A

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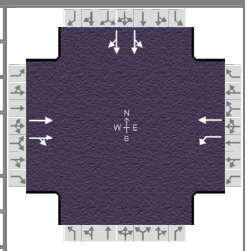
HCS7 Signalized Intersection Results Summary

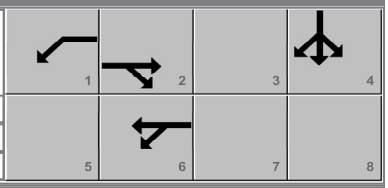
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	MEL	Analysis Date	May 22, 2020	Area Type	Other
Jurisdiction		Time Period	Full Build PM Peak	PHF	0.92
Urban Street	Carroll Street	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Goodkirk Street	File Name	Intersections - Full-Build PM.xus		
Project Description	SUM-8-0.00 Corridor Study				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		60	240	130	290					20	770	410

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	50	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.0	30.0	64.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6				4
Case Number		8.3	1.0	4.0				12.0
Phase Duration, s		36.0	14.0	50.0				70.0
Change Period, ($Y+R_c$), s		6.0	6.0	6.0				6.0
Max Allow Headway (*MAH*), s		0.0	3.2	0.0				3.2
Queue Clearance Time (g_s), s			8.8					37.1
Green Extension Time (g_e), s		0.0	0.0	0.0				3.3
Phase Call Probability			1.00					1.00
Max Out Probability			1.00					0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6					7	4	14
Adjusted Flow Rate (*v*), veh/h		57	226	141	315					720		585
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1870	1585	1781	1870					1868		1645
Queue Service Time (g_s), s		3.3	10.7	6.8	5.9					35.1		30.9
Cycle Queue Clearance Time (g_c), s		3.3	10.7	6.8	5.9					35.1		30.9
Green Ratio (*g/C*)		0.25	0.25	0.33	0.37					0.53		0.53
Capacity (*c*), veh/h		468	396	355	686					996		877
Volume-to-Capacity Ratio (*X*)		0.121	0.571	0.398	0.460					0.722		0.667
Back of Queue (*Q*), ft/ln (95 th percentile)		28	162	155.4	96.9					547		437.9
Back of Queue (*Q*), veh/ln (95 th percentile)		1.1	6.5	6.1	3.8					21.9		17.5
Queue Storage Ratio (*RQ*) (95 th percentile)		0.09	0.55	0.69	0.43					1.48		1.19
Uniform Delay (d_1), s/veh		14.9	21.0	31.1	7.4					21.3		20.3
Incremental Delay (d_2), s/veh		0.5	5.3	3.0	2.0					2.3		1.6
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0					0.0		0.0
Control Delay (*d*), s/veh		15.4	26.3	34.1	9.5					23.5		21.8
Level of Service (LOS)		B	C	C	A					C		C
Approach Delay, s/veh / LOS	24.1	C		17.1	B		0.0			22.8	C	
Intersection Delay, s/veh / LOS	21.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.71	B	1.70	B	2.16	B	1.97	B
Bicycle LOS Score / LOS	0.76	A	1.24	A			1.56	B

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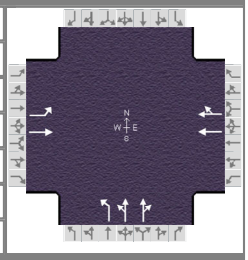
HCS7 Signalized Intersection Results Summary

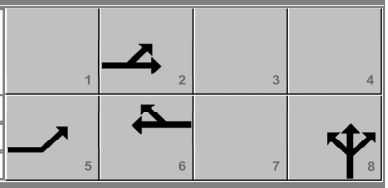
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	MEL	Analysis Date	May 22, 2020	Area Type	Other
Jurisdiction		Time Period	No-Build AM Peak	PHF	0.92
Urban Street	Carroll Street	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Fountain Street	File Name	Intersections - No-Build AM.xus		
Project Description	SUM-8-0.00 Corridor Study				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	20	20			120	20	450	840	140			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	117	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.0	39.0	55.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		8		
Case Number	1.0	4.0		8.3		10.0		
Phase Duration, s	14.0	59.0		45.0		61.0		
Change Period, ($Y+R_c$), s	6.0	6.0		6.0		6.0		
Max Allow Headway (MAH), s	3.2	0.0		0.0		3.1		
Queue Clearance Time (g_s), s	2.9					35.5		
Green Extension Time (g_e), s	0.0	0.0		0.0		3.3		
Phase Call Probability	1.00					1.00		
Max Out Probability	0.02					0.04		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16	3	8	18			
Adjusted Flow Rate (v), veh/h	21	21			77	76	440	624	490			
Adjusted Saturation Flow Rate (s), veh/h/ln	1697	1781			1841	1750	1590	1835	1582			
Queue Service Time (g_s), s	0.9	0.2			3.6	3.7	24.9	33.5	29.2			
Cycle Queue Clearance Time (g_c), s	0.9	0.2			3.6	3.7	24.9	33.5	29.2			
Green Ratio (g/C)	0.41	0.44			0.32	0.32	0.46	0.46	0.46			
Capacity (c), veh/h	520	787			598	569	729	841	725			
Volume-to-Capacity Ratio (X)	0.040	0.026			0.128	0.133	0.604	0.742	0.676			
Back of Queue (Q), ft/ln (95 th percentile)	16.3	4.6			76.2	73	365.8	542.2	411.8			
Back of Queue (Q), veh/ln (95 th percentile)	0.6	0.2			3.0	2.9	14.3	21.2	16.5			
Queue Storage Ratio (RQ) (95 th percentile)	0.07	0.02			0.17	0.17	0.73	0.90	0.70			
Uniform Delay (d_1), s/veh	20.6	4.8			28.5	28.6	24.3	26.7	25.5			
Incremental Delay (d_2), s/veh	0.0	0.1			0.4	0.5	1.0	3.1	2.1			
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Control Delay (d), s/veh	20.6	4.9			29.0	29.1	25.4	29.8	27.6			
Level of Service (LOS)	C	A			C	C	C	C	C			
Approach Delay, s/veh / LOS	12.7	B		29.0	C		27.8	C		0.0		
Intersection Delay, s/veh / LOS	27.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	1.70	B	1.97	B	2.16	B
Bicycle LOS Score / LOS	0.56	A	0.61	A	1.77	B		

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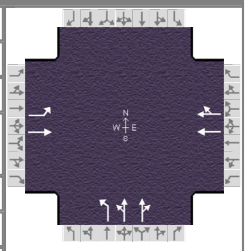
HCS7 Signalized Intersection Results Summary

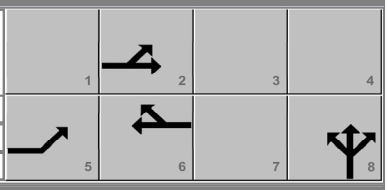
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	MEL	Analysis Date	May 22, 2020	Area Type	Other
Jurisdiction		Time Period	No-Build PM Peak	PHF	0.92
Urban Street	Carroll Street	Analysis Year	2045	Analysis Period	1> 17:00
Intersection	Fountain Street	File Name	Intersections - No-Build PM.xus		
Project Description	SUM-8-0.00 Corridor Study				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	40	40			80	40	340	700	130			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	117	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.0	42.0	52.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		8		
Case Number	1.0	4.0		8.3		10.0		
Phase Duration, s	14.0	62.0		48.0		58.0		
Change Period, ($Y+R_c$), s	6.0	6.0		6.0		6.0		
Max Allow Headway (*MAH*), s	3.2	0.0		0.0		3.1		
Queue Clearance Time (g_s), s	3.6					29.2		
Green Extension Time (g_e), s	0.0	0.0		0.0		2.6		
Phase Call Probability	1.00					1.00		
Max Out Probability	0.11					0.01		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16	3	8	18			
Adjusted Flow Rate (*v*), veh/h	39	39			66	64	333	525	414			
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767	1856			1811	1614	1590	1837	1573			
Queue Service Time (g_s), s	1.6	1.2			3.0	3.2	18.0	27.2	24.3			
Cycle Queue Clearance Time (g_c), s	1.6	1.2			3.0	3.2	18.0	27.2	24.3			
Green Ratio (*g/C*)	0.43	0.47			0.35	0.35	0.43	0.43	0.43			
Capacity (*c*), veh/h	582	866			634	565	689	796	682			
Volume-to-Capacity Ratio (*X*)	0.067	0.045			0.104	0.114	0.483	0.660	0.607			
Back of Queue (*Q*), ft/ln (95 th percentile)	30.5	25.6			63.5	59.4	279.2	451.2	350.2			
Back of Queue (*Q*), veh/ln (95 th percentile)	1.2	1.0			2.4	2.4	10.9	17.6	14.0			
Queue Storage Ratio (*RQ*) (95 th percentile)	0.14	0.11			0.14	0.14	0.56	0.75	0.60			
Uniform Delay (d_1), s/veh	20.5	15.6			26.3	26.4	24.4	27.0	26.1			
Incremental Delay (d_2), s/veh	0.0	0.1			0.3	0.4	0.2	1.6	1.1			
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Control Delay (*d*), s/veh	20.5	15.7			26.6	26.8	24.6	28.6	27.3			
Level of Service (LOS)	C	B			C	C	C	C	C			
Approach Delay, s/veh / LOS	18.1	B		26.7	C		27.1	C		0.0		
Intersection Delay, s/veh / LOS	26.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	1.70	B	1.97	B	2.16	B
Bicycle LOS Score / LOS	0.63	A	0.60	A	1.54	B		

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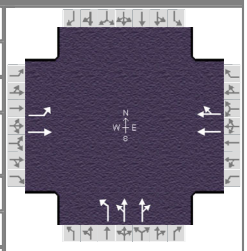
HCS7 Signalized Intersection Results Summary

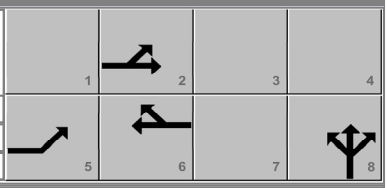
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	MEL	Analysis Date	May 22, 2020	Area Type	Other
Jurisdiction		Time Period	Full Build AM Peak	PHF	0.92
Urban Street	Carroll Street	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Fountain Street	File Name	Intersections - Full-Build AM.xus		
Project Description	SUM-8-0.00 Corridor Study				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	20	20			120	20	450	840	140			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	117	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.0	40.0	54.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		8		
Case Number	1.0	4.0		8.3		10.0		
Phase Duration, s	14.0	60.0		46.0		60.0		
Change Period, ($Y+R_c$), s	6.0	6.0		6.0		6.0		
Max Allow Headway (*MAH*), s	3.2	0.0		0.0		3.1		
Queue Clearance Time (g_s), s	2.9					33.3		
Green Extension Time (g_e), s	0.0	0.0		0.0		3.3		
Phase Call Probability	1.00					1.00		
Max Out Probability	0.02					0.03		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16	3	8	18			
Adjusted Flow Rate (*v*), veh/h	22	22			230	221	440	595	519			
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1697	1781			1841	1749	1767	1848	1763			
Queue Service Time (g_s), s	0.9	0.8			3.5	10.7	21.9	31.3	27.5			
Cycle Queue Clearance Time (g_c), s	0.9	0.8			3.5	10.7	21.9	31.3	27.5			
Green Ratio (*g/C*)	0.42	0.45			0.33	0.33	0.45	0.45	0.45			
Capacity (*c*), veh/h	391	802			614	583	795	832	793			
Volume-to-Capacity Ratio (*X*)	0.056	0.027			0.374	0.380	0.554	0.715	0.654			
Back of Queue (*Q*), ft/ln (95 th percentile)	17.5	16.9			191.8	200.7	357.2	513.7	427.5			
Back of Queue (*Q*), veh/ln (95 th percentile)	0.7	0.6			7.4	8.0	14.0	20.1	17.1			
Queue Storage Ratio (*RQ*) (95 th percentile)	0.08	0.08			0.77	0.83	0.71	0.86	0.73			
Uniform Delay (d_1), s/veh	21.4	18.4			23.8	27.2	24.2	26.8	25.7			
Incremental Delay (d_2), s/veh	0.0	0.1			1.6	1.7	0.5	2.5	1.5			
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Control Delay (*d*), s/veh	21.4	18.4			25.4	29.0	24.7	29.3	27.3			
Level of Service (LOS)	C	B			C	C	C	C	C			
Approach Delay, s/veh / LOS	19.9	B		27.2	C		27.3	C		0.0		
Intersection Delay, s/veh / LOS	27.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	1.70	B	1.97	B	2.16	B
Bicycle LOS Score / LOS	0.56	A	0.61	A	1.77	B		

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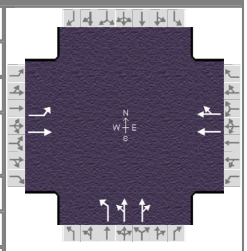
HCS7 Signalized Intersection Results Summary

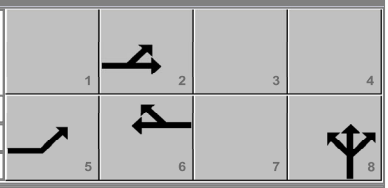
General Information				Intersection Information	
Agency	Burgess & Niple			Duration, h	0.250
Analyst	MEL	Analysis Date	May 22, 2020	Area Type	Other
Jurisdiction		Time Period	Full Build PM Peak	PHF	0.92
Urban Street	Carroll Street	Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Fountain Street	File Name	Intersections - Full-Build PM.xus		
Project Description	SUM-8-0.00 Corridor Study				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	40	40			80	40	340	700	130			

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	117	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.0	42.0	52.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6		8		
Case Number	1.0	4.0		8.3		10.0		
Phase Duration, s	14.0	62.0		48.0		58.0		
Change Period, ($Y+R_c$), s	6.0	6.0		6.0		6.0		
Max Allow Headway (*MAH*), s	3.2	0.0		0.0		3.1		
Queue Clearance Time (g_s), s	3.6					27.3		
Green Extension Time (g_e), s	0.0	0.0		0.0		2.6		
Phase Call Probability	1.00					1.00		
Max Out Probability	0.11					0.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16	3	8	18			
Adjusted Flow Rate (*v*), veh/h	39	39			66	64	333	501	438			
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1767	1856			1811	1614	1767	1849	1754			
Queue Service Time (g_s), s	1.6	1.3			3.0	3.2	15.8	25.3	22.7			
Cycle Queue Clearance Time (g_c), s	1.6	1.3			3.0	3.2	15.8	25.3	22.7			
Green Ratio (*g/C*)	0.43	0.47			0.35	0.35	0.43	0.43	0.43			
Capacity (*c*), veh/h	582	866			634	565	766	801	760			
Volume-to-Capacity Ratio (*X*)	0.067	0.045			0.104	0.114	0.434	0.625	0.577			
Back of Queue (*Q*), ft/ln (95 th percentile)	30.4	27.3			63.5	59.4	273.1	423.3	359.8			
Back of Queue (*Q*), veh/ln (95 th percentile)	1.2	1.1			2.4	2.4	10.7	16.5	14.4			
Queue Storage Ratio (*RQ*) (95 th percentile)	0.13	0.12			0.14	0.14	0.55	0.71	0.61			
Uniform Delay (d_1), s/veh	20.4	16.7			26.3	26.4	23.7	26.4	25.7			
Incremental Delay (d_2), s/veh	0.0	0.1			0.3	0.4	0.1	1.2	0.7			
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0	0.0	0.0	0.0			
Control Delay (*d*), s/veh	20.4	16.8			26.6	26.8	23.9	27.6	26.4			
Level of Service (LOS)	C	B			C	C	C	C	C			
Approach Delay, s/veh / LOS	18.6	B		26.7	C		26.2	C		0.0		
Intersection Delay, s/veh / LOS	25.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	1.70	B	1.97	B	2.16	B
Bicycle LOS Score / LOS	0.63	A	0.60	A	1.54	B		

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Appendix I

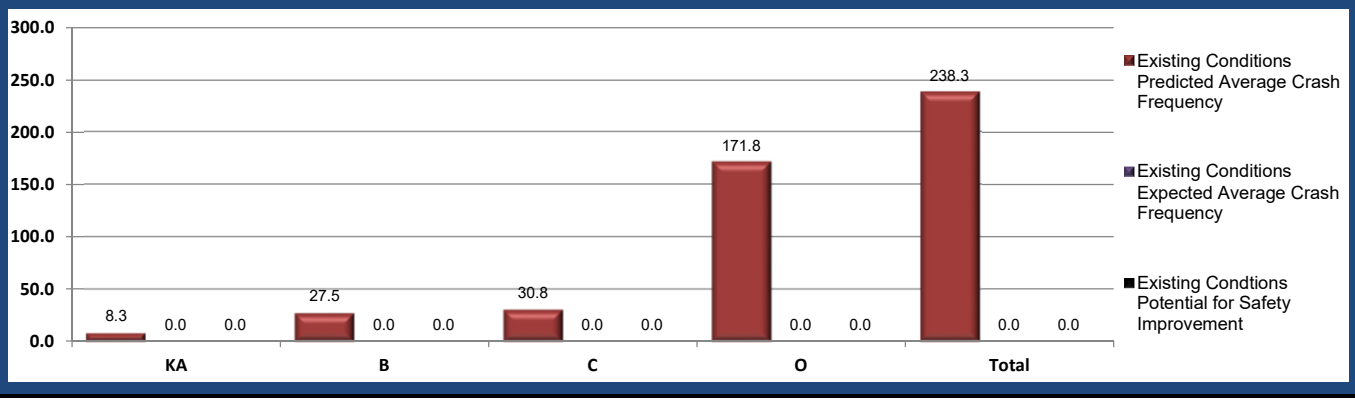
Safety Analysis

Project Safety Performance Report

General Information

Project Name	SUM 8	Contact Email	kendra.schenk@burgessniple.com
Project Description	SR8/I77 from US224/I277 to Tallmadge	Contact Phone	614-459-2050
Reference Number	PID 106589	Date Performed	April 2020
Analyst	KMS	Analysis Year	Existing Conditions
Agency/Company	Burgess & Niple, Inc.		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{predicted}$ - Existing Conditions	8.2976	27.4648	30.7896	171.7552	238.3072
$N_{expected}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
$N_{potential\ for\ improvement}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000

Project Safety Performance Report

ECAT Economic Crash Analysis Tool

General Information

Project Name	SUM 8	Contact Email	kendra.schenk@burgessniple.com
Project Description	SR8/I77 from US224/I277 to Tallmadge	Contact Phone	614-459-2050
Reference Number	PID 106589	Date Performed	April 2020
Analyst	KMS	Analysis Year	Existing Conditions
Agency/Company	Burgess & Niple, Inc.		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
IR77; 2.62-2.69	I-77 SB between I-76/I-77 Ramps and I-76 WB	0.0585	0.1945	0.2178	1.1147	1.5855
IR77; 2.69-3.2	I-77 SB between I-76/I-77 and Archwood	0.6207	2.0108	2.2259	13.0616	17.919
IR77; 3.2-3.7	I-77 SB between Archwood and Wilbeth	0.3481	1.1925	1.3359	7.0305	9.907
IR77; 3.7-4.07	I-77 SB between Wilbeth Ramps	0.265	0.8713	0.9702	5.0803	7.1868
IR77; 4.07-4.42	I-77 SB between Wilbeth and Waterloo	0.3857	1.2757	1.4237	8.4348	11.5199
IR77; 4.42-4.61	I-77 SB between Waterloo and US 224	0.1738	0.5722	0.6379	3.3892	4.7731
SR8N; 1.68-2.18	SR 8 SB between Carroll and I-76/I-77	0.385	1.3647	1.5399	7.2999	10.5895
SR8N; 2.18-2.62	SR 8 SB between I-76/I-77 Ramps	0.1701	0.546	0.6025	4.2243	5.5429
Archwood_Off	Archwood Ramp	0.0156	0.0675	0.0873	0.1788	0.3492
IR77; 0-0.34	I-77 NB between US 224 and Waterloo	0.1987	0.6611	0.7199	3.7344	5.3141
IR77; 0.34-0.57	I-77 NB between Waterloo and Wilbeth	0.2703	0.908	1.0197	6.1994	8.3974
IR77; 0.57-1.01	I-77 NB between Wilbeth Ramps	0.3188	1.0528	1.1748	6.1702	8.7166
IR77; 1.01-1.55	I-77 NB between Wilbeth and Archwood	0.3908	1.3366	1.4958	7.8411	11.0643
IR77; 1.55-2.02	I-77 NB between Archwood and I-76/I-77	0.7638	2.6249	2.9734	16.1975	22.5596
Carroll_Off	Carroll Off	0.0588	0.1916	0.4127	1.8099	2.473
SR8N; 2.65-3.05	SR 8 NB between I-76/I-77 and Carroll	0.5669	1.9676	2.2375	11.7906	16.5626
SR8N; 2.02-2.65	I-77 NB between I-76/I-77 Ramps	0.2478	0.7849	0.8611	6.0064	7.9002
SR8N; 0-0.74	SR 8 SB between Glenwood and Perkins	0.7613	2.3949	2.6197	15.8212	21.5971
SR8N; 0.74-1.07	SR 8 SB between Perkins Ramps	0.2112	0.683	0.7555	3.8697	5.5194
SR8N; 1.07-1.17	SR 8 SB between Perkins and Buchtel	0.1167	0.3975	0.4483	2.9088	3.8713
SR8N; 1.17-1.68	SR 8 SB between Buchtel and Carroll	0.313	0.9968	1.0962	5.4512	7.8572
SR8N; 3.05-3.55	SR 8 NB between Carroll and Bucthel	0.3288	1.0599	1.1714	5.8931	8.4532
SR8N; 3.55-3.67	SR 8 NB between Bucthel and Perkins	0.1483	0.5048	0.5697	3.696	4.9188
SR8N; 3.67-3.97	SR 8 NB between Perkins Ramps	0.1982	0.6585	0.7365	3.8103	5.4035
SR8N; 3.97-4.72	SR 8 NB between Perkins and Glenwood	0.8439	2.6822	2.947	18.104	24.5771
SR8N; 4.72-5	SR 8 NB between Glenwood and Tallmadge	0.1378	0.4645	0.5093	2.6373	3.7489

Project Safety Performance Report

ECAT Economic Crash Analysis Tool

General Information

Project Name	SUM 8	Contact Email	kendra.schenk@burgessniple.com
Project Description	SR8/I77 from US224/I277 to Tallmadge	Contact Phone	614-459-2050
Reference Number	PID 106589	Date Performed	April 2020
Analyst	KMS	Analysis Year	Existing Conditions
Agency/Company	Burgess & Niple, Inc.		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
IR77; 2.62-2.69	I-77 SB between I-76/I-77 Ramps and I-76 WB	0	0	0	0	0
IR77; 2.69-3.2	I-77 SB between I-76/I-77 and Archwood	0	0	0	0	0
IR77; 3.2-3.7	I-77 SB between Archwood and Wilbeth	0	0	0	0	0
IR77; 3.7-4.07	I-77 SB between Wilbeth Ramps	0	0	0	0	0
IR77; 4.07-4.42	I-77 SB between Wilbeth and Waterloo	0	0	0	0	0
IR77; 4.42-4.61	I-77 SB between Waterloo and US 224	0	0	0	0	0
SR8N; 1.68-2.18	SR 8 SB between Carroll and I-76/I-77	0	0	0	0	0
SR8N; 2.18-2.62	SR 8 SB between I-76/I-77 Ramps	0	0	0	0	0
Archwood_Off	Archwood Ramp	0	0	0	0	0
IR77; 0-0.34	I-77 NB between US 224 and Waterloo	0	0	0	0	0
IR77; 0.34-0.57	I-77 NB between Waterloo and Wilbeth	0	0	0	0	0
IR77; 0.57-1.01	I-77 NB between Wilbeth Ramps	0	0	0	0	0
IR77; 1.01-1.55	I-77 NB between Wilbeth and Archwood	0	0	0	0	0
IR77; 1.55-2.02	I-77 NB between Archwood and I-76/I-77	0	0	0	0	0
Carroll_Off	Carroll Off	0	0	0	0	0
SR8N; 2.65-3.05	SR 8 NB between I-76/I-77 and Carroll	0	0	0	0	0
SR8N; 2.02-2.65	I-77 NB between I-76/I-77 Ramps	0	0	0	0	0
SR8N; 0-0.74	SR 8 SB between Glenwood and Perkins	0	0	0	0	0
SR8N; 0.74-1.07	SR 8 SB between Perkins Ramps	0	0	0	0	0
SR8N; 1.07-1.17	SR 8 SB between Perkins and Buchtel	0	0	0	0	0
SR8N; 1.17-1.68	SR 8 SB between Buchtel and Carroll	0	0	0	0	0
SR8N; 3.05-3.55	SR 8 NB between Carroll and Bucthel	0	0	0	0	0
SR8N; 3.55-3.67	SR 8 NB between Bucthel and Perkins	0	0	0	0	0
SR8N; 3.67-3.97	SR 8 NB between Perkins Ramps	0	0	0	0	0
SR8N; 3.97-4.72	SR 8 NB between Perkins and Glenwood	0	0	0	0	0
SR8N; 4.72-5	SR 8 NB between Glenwood and Tallmadge	0	0	0	0	0

Project Safety Performance Report

ECAT Economic Crash Analysis Tool

General Information

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Reference Number	PID 106589	Date Performed	April 2020
Analyst	KMS	Analysis Year	Existing Conditions
Agency/Company	Burgess & Niple, Inc.		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
IR77; 2.62-2.69	I-77 SB between I-76/I-77 Ramps and I-76 WB					0
IR77; 2.69-3.2	I-77 SB between I-76/I-77 and Archwood					0
IR77; 3.2-3.7	I-77 SB between Archwood and Wilbeth					0
IR77; 3.7-4.07	I-77 SB between Wilbeth Ramps					0
IR77; 4.07-4.42	I-77 SB between Wilbeth and Waterloo					0
IR77; 4.42-4.61	I-77 SB between Waterloo and US 224					0
SR8N; 1.68-2.18	SR 8 SB between Carroll and I-76/I-77					0
SR8N; 2.18-2.62	SR 8 SB between I-76/I-77 Ramps					0
Archwood_Off	Archwood Ramp					0
IR77; 0-0.34	I-77 NB between US 224 and Waterloo					0
IR77; 0.34-0.57	I-77 NB between Waterloo and Wilbeth					0
IR77; 0.57-1.01	I-77 NB between Wilbeth Ramps					0
IR77; 1.01-1.55	I-77 NB between Wilbeth and Archwood					0
IR77; 1.55-2.02	I-77 NB between Archwood and I-76/I-77					0
Carroll_Off	Carroll Off					0
SR8N; 2.65-3.05	SR 8 NB between I-76/I-77 and Carroll					0
SR8N; 2.02-2.65	I-77 NB between I-76/I-77 Ramps					0
SR8N; 0-0.74	SR 8 SB between Glenwood and Perkins					0
SR8N; 0.74-1.07	SR 8 SB between Perkins Ramps					0
SR8N; 1.07-1.17	SR 8 SB between Perkins and Buchtel					0
SR8N; 1.17-1.68	SR 8 SB between Buchtel and Carroll					0
SR8N; 3.05-3.55	SR 8 NB between Carroll and Bucthel					0
SR8N; 3.55-3.67	SR 8 NB between Bucthel and Perkins					0
SR8N; 3.67-3.97	SR 8 NB between Perkins Ramps					0
SR8N; 3.97-4.72	SR 8 NB between Perkins and Glenwood					0
SR8N; 4.72-5	SR 8 NB between Glenwood and Tallmadge					0

Project Safety Performance Report

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Agency/Company	Burgess & Niple, Inc.		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.5926			
Head On	0.4596			
Rear End	110.4068			
Backing	1.2921			
Sideswipe - Meeting	2.1825			
Sideswipe - Passing	74.4632			
Angle	2.8973			
Parked Vehicle	1.8853			
Pedestrian	0.2529			
Animal	13.5180			
Train	0.0000			
Pedalcycles	0.0198			
Other Non-Vehicle	0.0000			
Fixed Object	31.0737			
Other Object	4.2251			
Overturning	1.7214			
Other Non-Collision	6.0081			
Left Turn	0.8268			
Right Turn	0.0000			

Project Safety Performance Report

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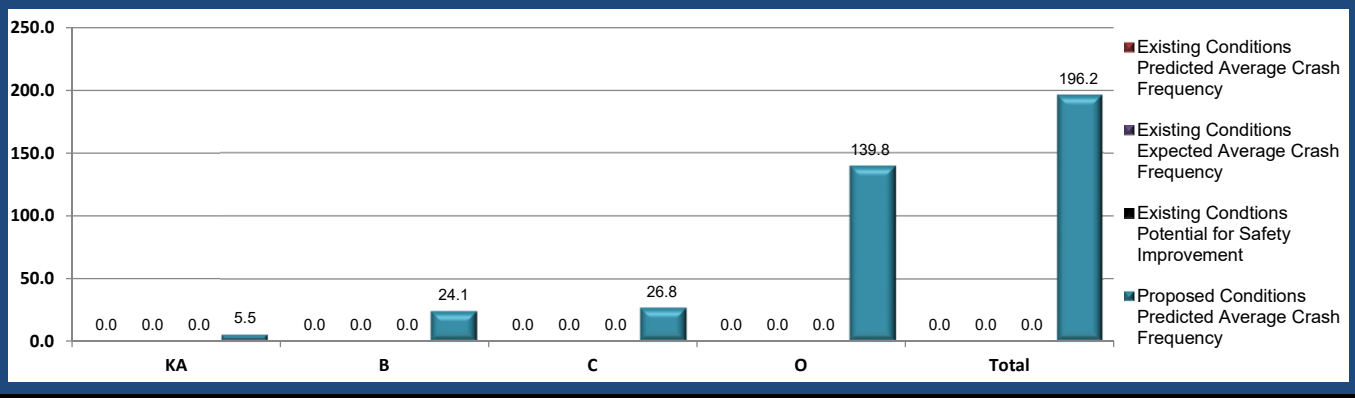
Analyst	KMS	Analysis Year	PBPD
Agency/Company	Burgess & Niple, Inc.		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{predicted}$ - Existing Conditions					0.0000
$N_{expected}$ - Existing Conditions					0.0000
$N_{potential\ for\ improvement}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
$N_{predicted}$ - Proposed Conditions	5.5397	24.1029	26.8110	139.7923	196.2459

Project Safety Performance Report

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Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
SR8N; 0-0.74	SR 8 SB between Glenwood and Perkins	0.7182	2.2654	2.4729	14.885	20.3415
SR8N; 0-0.42	Ramp to I-76/I-77	0.0485	0.3962	0.6938	2.2673	3.4058
SR8N; 0-0.3	Ramp from Goodkirk to I-76/I-77	0.0377	0.258	0.3098	1.1662	1.7717
SR8N; 0-0.31	Ramp from SR 8 to I-76/I-77	0.1432	1.5822	1.9432	7.8474	11.516
SR8N; 0.74-1.07	SR 8 SB between Perkins Ramps	0.1555	0.6764	0.7169	4.0361	5.5849
SR8N; 1.07-1.17	SR 8 SB between Perkins and Buchtel	0.0504	0.2502	0.2807	1.1325	1.7138
SR8N; 1.17-1.52	SR 8 SB between Buchtel and I-76/I-77 Ramp	0.1681	0.7309	0.7753	4.2591	5.9334
SR8N; 1.52-1.88	SR 8 SB between I-76/I-77 Off-Ramps and Ca	0.0547	0.2342	0.2468	1.2172	1.7529
SR8N; 1.88-2.62	SR 8 SB between Carroll and I-76/I-77 On-Ra	0.1424	0.5989	0.6238	3.4134	4.7785
SR8N; 2.02-2.65	I-77 NB between I-76/I-77 Ramps	0.1381	0.5693	0.5881	3.4741	4.7696
SR8N; 2.65-3.05	SR 8 NB between I-76/I-77 and Carroll	0.178	0.8546	0.939	3.421	5.3926
SR8N; 3.05-3.55	SR 8 NB between Carroll and Bucthel	0.2347	1.0298	1.0959	6.1423	8.5027
SR8N; 3.55-3.67	SR 8 NB between Bucthel and Perkins	0.0667	0.3237	0.3602	1.4356	2.1862
SR8N; 3.67-3.97	SR 8 NB between Perkins Ramps	0.1982	0.6585	0.7365	3.8103	5.4035
SR8N; 3.97-4.72	SR 8 NB between Perkins and Glenwood	0.7881	2.5136	2.7548	16.8666	22.9231
SR8N; 4.72-5	SR 8 NB between Glenwood and Tallmadge	0.1575	0.722	0.7837	4.6038	6.267
IR77; 2.62-2.69	I-77 SB between I-77 EB On-Ramp and I-76 W	0.0522	0.2199	0.2296	1.2775	1.7792
IR77; 2.69-3.2	I-77 SB between I-76/I-77 and Archwood	0.261	1.2381	1.3636	5.1016	7.9643
IR77; 3.2-3.7	I-77 SB between Archwood and Wilbeth	0.2541	1.1313	1.2101	7.4111	10.0066
IR77; 3.7-4.07	I-77 SB between Wilbeth Ramps	0.1861	0.8356	0.8989	5.2262	7.1468
IR77; 4.07-4.42	I-77 SB between Wilbeth and Waterloo	0.1605	0.7776	0.8639	3.2636	5.0656
IR77; 4.42-4.61	I-77 SB between Waterloo and US 224	0.1175	0.5351	0.5794	3.4424	4.6744
IR77; 0-0.34	I-77 NB between US 224 and Waterloo	0.2002	0.907	0.9798	5.8323	7.9193
IR77; 0.34-0.57	I-77 NB between Waterloo and Wilbeth	0.1119	0.5513	0.6164	2.387	3.6666
IR77; 0.57-1.01	I-77 NB between Wilbeth Ramps	0.2231	1.0081	1.0875	6.338	8.6567
IR77; 1.01-1.55	I-77 NB between Wilbeth and Archwood	0.2931	1.3238	1.4264	8.1211	11.1644
IR77; 1.55-2.02	I-77 NB between Archwood and I-76/I-77	0.3379	1.6668	1.8623	10.2689	14.1359
Carroll_Off	Carroll Off	0.0348	0.1546	0.2009	0.4778	0.8681
Archwood_Off	Archwood Ramp	0.0273	0.0898	0.1708	0.6669	0.9548

Project Safety Performance Report

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Analyst	KMS	Analysis Year	PBPD
Agency/Company	Burgess & Niple, Inc.		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown				0.6000
Head On				0.2722
Rear End				84.9893
Backing				1.0185
Sideswipe - Meeting				1.6608
Sideswipe - Passing				56.2178
Angle				2.2356
Parked Vehicle				1.9621
Pedestrian				0.2057
Animal				18.6805
Train				0.0000
Pedalcycles				0.0140
Other Non-Vehicle				0.0000
Fixed Object				31.2864
Other Object				3.9926
Overturning				1.8915
Other Non-Collision				5.7361
Left Turn				0.6498
Right Turn				0.0000

Appendix J

Cost Estimate

SUM-8 Corridor Study (4/10/2020)
Cost Estimate Summary - PBPD Strategy
(Updated Limits)

	Current Cost Estimates	
Design Build	$98M	Preliminary
Central Interchange	$50M	Stage 3 Estimate
SUM-8 Bridge	$131.8M	Stage 3; Per Ellis

Carroll Ramp Braid	$46.0M	Assumes 30% Contingency + 35% Inflation (2030 Construction); Includes Estimated Design Fee

	Additional PBPD Costs	
	NB	**SB**
DB (SR-224 To Carroll)	$1,633,500	$2,943,600
DB (Carroll To Perkins)	NA	NA
CI (Resurface/Widen)	NA	$1,853,500
CI (Additional Full Depth)	$1,856,800	$1,232,000
SUM-8 Bridge	NA	$550,000
SUBTOTAL:	$3,490,300.00	$6,579,100.00
GRAND TOTAL:	**$10,069,400.00**	

Note: NB SR-224 To Carroll Includes Carroll 2-Lane Exit

	Additional Full Build Costs	
	NB	**SB**
DB (SR-224 To Carroll)	$2,778,880	$32,757,590
DB (Carroll To Perkins)	$0	$0
CI (Resurface/Widen)	$0	$20,584,300
CI (Additional Full Depth)	NA	NA
SUM-8 Bridge	$0	$3,519,376
SUBTOTAL:	$2,778,880.00	$56,861,266.00
GRAND TOTAL:	**$59,640,146.00**	

	Noise Wall Cost Summary	
	NB	**SB**
SR-224 to Wilbeth	$1.3M	$1.3M
Wilbeth to Lovers*	$2.1M	$2.1M
Johnston to Buchtel	$0.0M	$1.1M
Buchtel to Perkins	$0.0M	$0.0M
TOTAL	**$3.4M**	**$4.5M**

* Already been studied by PID106252 and PID108872

SUM-8-0.00 CORRIDOR STUDY

SR-8 NB PBPD - DB TO CARROLL ADDITIONAL COSTS
COST ESTIMATE (4/10/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED	4,694	SQ YD	$5.60	$26,285
203	10000	EXCAVATION	13,462	CU YD	$8.00	$107,694
203	20000	EMBANKMENT	7,856	CU YD	$9.00	$70,700
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	0	FT	$110.00	$0
609	24000	CURB, TYPE 4	2,500	FT	$15.00	$37,500
					ROADWAY SUBTOTAL	**$242,200**
		DRAINAGE				
			1	LUMP	$150,000.00	$150,000
					DRAINAGE SUBTOTAL	**$150,000**
		PAVEMENT				
		FULL DEPTH PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	8,667	SQ YD	$50.15	$434,667
		FULL DEPTH PAVEMENT - CONCRETE				
		CONCRETE PAVEMENT BUILD-UP	8,667	SQ YD	$101.67	$881,208
					PAVEMENT SUBTOTAL	**$434,700**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	1	LUMP	$150,000.00	$150,000
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$150,000**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	1	LUMP	$120,000.00	$120,000
					TRAFFIC CONTROL SUBTOTAL	**$120,000**
		LIGHTING				
		LIGHTING LUMP SUM	1	LUMP	$45,000.00	$45,000
					LIGHTING SUBTOTAL	**$45,000**
		STRUCTURES				
		RETAINING WALLS	0	SQ FT	$130.00	$0
		CONCRETE OVERLAY (BEACON STREET BRIDGE)	0	SQ FT	$150.00	$0
		CONCRETE OVERLAY (EXCHANGE STREET BRIDGE)	0	SQ FT	$150.00	$0
					STRUCTURES SUBTOTAL	**$0**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	0	MONTH	$0.00	$0
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	0	LUMP	$0.00	$0
624	10000	MOBILIZATION	0	LUMP	$0.00	$0
					CONSTRUCTION MISC. SUBTOTAL	**$0**
					CONSTRUCTION COST SUBTOTOAL	**$1,141,900**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$342,570**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$1,485,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2025)	10.0%			$148,500
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2025 DOLLARS				**$1,633,500**

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.

SUM-8-0.00 CORRIDOR STUDY

SR-8 SB PBPD - DB TO CARROLL ADDITIONAL COSTS
COST ESTIMATE (4/10/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED	3,501	SQ YD	$5.60	$19,606
203	10000	EXCAVATION	20,121	CU YD	$8.00	$160,965
203	20000	EMBANKMENT	16,742	CU YD	$9.00	$150,677
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	1,400	FT	$110.00	$154,000
609	24000	CURB, TYPE 4	5,600	FT	$15.00	$84,000
					ROADWAY SUBTOTAL	**$569,300**
		DRAINAGE				
		APPROX. AN ADDITIONAL 15% TO CURRENT DESIGN BUILD ESTIMATE	1	LUMP	$350,000.00	$350,000
					DRAINAGE SUBTOTAL	**$350,000**
		PAVEMENT				
		FULL DEPTH PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	7,212	SQ YD	$50.15	$361,676
		FULL DEPTH PAVEMENT - CONCRETE				
		CONCRETE PAVEMENT BUILD-UP	7,212	SQ YD	$101.67	$733,233
					PAVEMENT SUBTOTAL	**$361,700**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	1	LUMP	$150,000.00	$150,000
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$150,000**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	1	LUMP	$85,000.00	$85,000
					TRAFFIC CONTROL SUBTOTAL	**$85,000**
		LIGHTING				
		LIGHTING LUMP SUM	1	LUMP	$45,000.00	$45,000
					LIGHTING SUBTOTAL	**$45,000**
		STRUCTURES				
		RETAINING WALLS	1500	SQ FT	$130.00	$195,000
		CONCRETE OVERLAY (BEACON STREET BRIDGE)	1	LUMP	$160,500.00	$160,500
		CONCRETE OVERLAY (EXCHANGE STREET BRIDGE)	1	LUMP	$141,750.00	$141,750
					STRUCTURES SUBTOTAL	**$497,300**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	0	MONTH	$0.00	$0
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	0	LUMP	$0.00	$0
624	10000	MOBILIZATION	0	LUMP	$0.00	$0
					CONSTRUCTION MISC. SUBTOTAL	**$0**
					CONSTRUCTION COST SUBTOTOAL	**$2,058,300**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$617,490**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$2,676,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2025)	10.0%			$267,600
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2025 DOLLARS				**$2,943,600**

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.

SUM-8-0.00 CORRIDOR STUDY

SR-8 SB PBPD - CI WIDENING ADDITIONAL COSTS
COST ESTIMATE (4/10/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED	4,546	SQ YD	$8.75	$39,778
203	10000	EXCAVATION	10,038	CU YD	$12.50	$125,475
203	20000	EMBANKMENT	1,101	CU YD	$9.00	$9,908
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	500	FT	$110.00	$55,000
609	24000	CURB, TYPE 4	2,500	FT	$15.00	$37,500
					ROADWAY SUBTOTAL	**$267,700**
		DRAINAGE				
		DRAINAGE LUMP SUM	1	LUMP	$80,000.00	$80,000
					DRAINAGE SUBTOTAL	**$80,000**
		PAVEMENT				
		FULL DEPTH PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	7,394	SQ YD	$50.15	$370,804
					PAVEMENT SUBTOTAL	**$370,900**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	1	LUMP	$50,000.00	$50,000
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$50,000**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	1	LUMP	$300,000.00	$300,000
					TRAFFIC CONTROL SUBTOTAL	**$300,000**
		LIGHTING				
		LIGHTING LUMP SUM	0	LUMP	$0.00	$0
					LIGHTING SUBTOTAL	**$0**
		STRUCTURES				
		RETAINING WALLS	1,750	SQ FT	$130.00	$227,500
					STRUCTURES SUBTOTAL	**$227,500**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	0	MONTH	$0.00	$0
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	0	LUMP	$0.00	$0
624	10000	MOBILIZATION	0	LUMP	$0.00	$0
					CONSTRUCTION MISC. SUBTOTAL	**$0**
					CONSTRUCTION COST SUBTOTOAL	**$1,296,100**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$388,830**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$1,685,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2025)	10.0%			$168,500
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2025 DOLLARS				**$1,853,500**

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.

SUM-8-0.00 CORRIDOR STUDY

SR-8 NB PBPD - CI FULL DEPTH ADDITIONAL COSTS
COST ESTIMATE (4/10/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED	16,042	SQ YD	$8.75	$140,364
203	10000	EXCAVATION	5,556	CU YD	$8.00	$44,444
203	20000	EMBANKMENT	956	CU YD	$9.00	$8,608
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	500	FT	$110.00	$55,000
609	24000	CURB, TYPE 4	2,000	FT	$15.00	$30,000
					ROADWAY SUBTOTAL	**$278,500**
		DRAINAGE				
		DRAINAGE LUMP SUM	1	LUMP	$65,000.00	$65,000
					DRAINAGE SUBTOTAL	**$65,000**
		PAVEMENT				
		FULL DEPTH PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	16,042	SQ YD	$50.15	$804,484
		FULL DEPTH PAVEMENT - CONCRETE				
		CONCRETE PAVEMENT BUILD-UP	16,042	SQ YD	$101.67	$1,630,945
					PAVEMENT SUBTOTAL	**$804,500**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	1	LUMP	$120,000.00	$120,000
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$120,000**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	1	LUMP	$30,000.00	$30,000
					TRAFFIC CONTROL SUBTOTAL	**$30,000**
		LIGHTING				
		LIGHTING LUMP SUM	0	LUMP	$0.00	$0
					LIGHTING SUBTOTAL	**$0**
		STRUCTURES				
		RETAINING WALLS	0	SQ FT	$130.00	$0
					STRUCTURES SUBTOTAL	**$0**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	0	MONTH	$0.00	$0
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	0	LUMP	$0.00	$0
624	10000	MOBILIZATION	0	LUMP	$0.00	$0
					CONSTRUCTION MISC. SUBTOTAL	**$0**
					CONSTRUCTION COST SUBTOTOAL	**$1,298,000**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$389,400**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$1,688,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2025)	10.0%			$168,800
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2025 DOLLARS				**$1,856,800**

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.

SUM-8-0.00 CORRIDOR STUDY

SR-8 SB PBPD - CI FULL DEPTH ADDITIONAL COSTS
COST ESTIMATE (4/10/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED	17,574	SQ YD	$8.75	$153,772
203	10000	EXCAVATION	18,224	CU YD	$8.00	$145,793
203	20000	EMBANKMENT	1,468	CU YD	$9.00	$13,210
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	500	FT	$110.00	$55,000
609	24000	CURB, TYPE 4	2,500	FT	$15.00	$37,500
					ROADWAY SUBTOTAL	**$405,300**
		DRAINAGE				
		DRAINAGE LUMP SUM	1	LUMP	$80,000.00	$80,000
					DRAINAGE SUBTOTAL	**$80,000**
		PAVEMENT				
		FULL DEPTH PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	20,422	SQ YD	$50.15	$1,024,174
		FULL DEPTH PAVEMENT - CONCRETE				
		CONCRETE PAVEMENT BUILD-UP	20,422	SQ YD	$101.67	$2,076,327
					PAVEMENT SUBTOTAL	**$1,024,200**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	1	LUMP	$120,000.00	$120,000
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$120,000**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	1	LUMP	$300,000.00	$300,000
					TRAFFIC CONTROL SUBTOTAL	**$300,000**
		LIGHTING				
		LIGHTING LUMP SUM	0	LUMP	$0.00	$0
					LIGHTING SUBTOTAL	**$0**
		STRUCTURES				
		RETAINING WALLS	1,750	SQ FT	$130.00	$227,500
					STRUCTURES SUBTOTAL	**$227,500**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	0	MONTH	$0.00	$0
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	0	LUMP	$0.00	$0
624	10000	MOBILIZATION	0	LUMP	$0.00	$0
					CONSTRUCTION MISC. SUBTOTAL	**$0**
					CONSTRUCTION COST SUBTOTOAL	**$2,157,000**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$647,100**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$2,805,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2025)	10.0%			$280,500
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2025 DOLLARS				**$3,085,500**

Subtract SB CI Resurface and Widen Cost to get Additional Full Depth Total

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.

SUM-8-0.00 CORRIDOR STUDY

SR-8 SB PBPD - SUM-8 BRIDGE ADDITIONAL COSTS
COST ESTIMATE (4/10/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED	3,296	SQ YD	$8.75	$28,844
203	10000	EXCAVATION	1,296	CU YD	$12.50	$16,204
203	20000	EMBANKMENT	926	CU YD	$9.00	$8,333
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	150	FT	$110.00	$16,500
609	24000	CURB, TYPE 4	1,250	FT	$15.00	$18,750
					ROADWAY SUBTOTAL	**$88,700**
		DRAINAGE				
		15% TOTAL COST FOR DRAINAGE, EROSION CONTROL, AND BMP ELEMENTS	1	LUMP	$50,070.00	$50,070
					DRAINAGE SUBTOTAL	**$50,100**
		PAVEMENT				
		FULL DEPTH PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	3,092	SQ YD	$50.15	$155,047
					PAVEMENT SUBTOTAL	**$155,100**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	1	LUMP	$40,000.00	$20,000
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$20,000**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	1	LUMP	$15,000.00	$15,000
					TRAFFIC CONTROL SUBTOTAL	**$15,000**
		LIGHTING				
		LIGHTING LUMP SUM	1	LUMP	$55,000.00	$55,000
					LIGHTING SUBTOTAL	**$55,000**
		STRUCTURES				
		RETAINING WALLS	0	SQ FT	$130.00	$0
					STRUCTURES SUBTOTAL	**$0**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	0	MONTH	$0.00	$0
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	0	LUMP	$0.00	$0
624	10000	MOBILIZATION	0	LUMP	$0.00	$0
					CONSTRUCTION MISC. SUBTOTAL	**$0**
					CONSTRUCTION COST SUBTOTOAL	**$383,900**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$115,170**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$500,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2025)	10.0%			$50,000
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2025 DOLLARS				**$550,000**

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.

SUM-8 Corridor Study (4/10/2020)
Cost Estimate Summary - Braid + PBPD Strategy
(Updated Limits)

	Additional Braid PBPD Costs	
	NB	**SB**
DB (SR-224 To Carroll)	$1,717,100	$0
North of Carroll*	$1,249,600	$1,074,700
CI (Resurface/Widen)	$874,500	$0
CI (Additional Full Depth)	NA	NA
Braid	NA	$41,790,000
SUBTOTAL:	$3,841,200.00	$42,864,700.00
GRAND TOTAL:	**$46,705,900.00**	

* Includes "DB Carroll to Perkins" and "SUM-8 Bridge" Detailed Cost Estimates

	Noise Wall Cost Summary	
	NB	**SB**
Johnston to Buchtel	$1.7M	$1.1M
Buchtel to Perkins	$0.9M	$0.9M
TOTAL	**$2.6M**	**$2.0M**

SUM-8-0.00 CORRIDOR STUDY

SR-8 NB PBPD - DB TO CARROLL ADDITIONAL COSTS
COST ESTIMATE (4/10/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED		SQ YD	$5.60	$0
203	10000	EXCAVATION		CU YD	$8.00	$0
203	20000	EMBANKMENT		CU YD	$9.00	$0
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	0	FT	$110.00	$0
609	24000	CURB, TYPE 4	0	FT	$15.00	$0
					ROADWAY SUBTOTAL	**$0**
		DRAINAGE				
			1	LUMP	$150,000.00	$150,000
					DRAINAGE SUBTOTAL	**$150,000**
		PAVEMENT				
		FULL DEPTH PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	7,010	SQ YD	$50.15	$351,540
		RESURFACING - ASPHALT				
		RESURFACING	8,570	SQ YD	$7.25	$62,132
		FULL DEPTH PAVEMENT - CONCRETE				
		CONCRETE PAVEMENT BUILD-UP	7,010	SQ YD	$101.67	$712,684
					PAVEMENT SUBTOTAL	**$413,700**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	1	LUMP	$150,000.00	$150,000
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$150,000**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	1	LUMP	$120,000.00	$120,000
					TRAFFIC CONTROL SUBTOTAL	**$120,000**
		LIGHTING				
		LIGHTING LUMP SUM	1	LUMP	$45,000.00	$45,000
					LIGHTING SUBTOTAL	**$45,000**
		STRUCTURES				
		RETAINING WALLS	0	SQ FT	$130.00	$0
		CONCRETE OVERLAY (BEACON STREET BRIDGE)	1230	SQ FT	$150.00	$184,500
		CONCRETE OVERLAY (EXCHANGE STREET BRIDGE)	915	SQ FT	$150.00	$137,250
					STRUCTURES SUBTOTAL	**$321,800**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	0	MONTH	$0.00	$0
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	0	LUMP	$0.00	$0
624	10000	MOBILIZATION	0	LUMP	$0.00	$0
					CONSTRUCTION MISC. SUBTOTAL	**$0**
					CONSTRUCTION COST SUBTOTOAL	**$1,200,500**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$360,150**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$1,561,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2025)	10.0%			$156,100
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2025 DOLLARS				**$1,717,100**

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.

SUM-8-0.00 CORRIDOR STUDY

SR-8 NB PBPD - DB CARROLL TO PERKINS ADDITIONAL COSTS
COST ESTIMATE (4/10/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED	4,087	SQ YD	$5.60	$22,885
203	10000	EXCAVATION	185	CU YD	$8.00	$1,481
203	20000	EMBANKMENT	322	CU YD	$9.00	$2,897
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	400	FT	$110.00	$44,000
609	24000	CURB, TYPE 4	2,200	FT	$15.00	$33,000
					ROADWAY SUBTOTAL	**$104,300**
		DRAINAGE				
		15% TOTAL COST FOR DRAINAGE, EROSION CONTROL, AND BMP ELEMENTS		LUMP	$70,305.00	$0
					DRAINAGE SUBTOTAL	**$0**
		PAVEMENT				
		FULL DEPTH PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	4,861	SQ YD	$50.15	$243,785
		RESURFACING - ASPHALT				
		RESURFACING	16,634	SQ YD	$7.25	$120,600
		FULL DEPTH PAVEMENT - CONCRETE				
		CONCRETE PAVEMENT BUILD-UP	4,861	SQ YD	$101.67	$494,229
					PAVEMENT SUBTOTAL	**$364,400**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	0	LUMP	$80,000.00	$0
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$0**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	0	LUMP	$60,000.00	$0
					TRAFFIC CONTROL SUBTOTAL	**$0**
		LIGHTING				
		LIGHTING LUMP SUM	0	LUMP	$35,000.00	$0
					LIGHTING SUBTOTAL	**$0**
		STRUCTURES				
		RETAINING WALLS	0	SQ FT	$130.00	$0
					STRUCTURES SUBTOTAL	**$0**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	0	MONTH	$0.00	$0
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	0	LUMP	$0.00	$0
624	10000	MOBILIZATION	0	LUMP	$0.00	$0
					CONSTRUCTION MISC. SUBTOTAL	**$0**
					CONSTRUCTION COST SUBTOTOAL	**$468,700**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$140,610**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$610,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2025)	10.0%			$61,000
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2025 DOLLARS				**$671,000**

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.

SUM-8-0.00 CORRIDOR STUDY

SR-8 SB PBPD - DB CARROLL TO PERKINS ADDITIONAL COSTS
COST ESTIMATE (4/10/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED	2,186	SQ YD	$5.60	$12,244
203	10000	EXCAVATION	913	CU YD	$8.00	$7,304
203	20000	EMBANKMENT	185	CU YD	$9.00	$1,667
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	450	FT	$110.00	$49,500
609	24000	CURB, TYPE 4	1,300	FT	$15.00	$19,500
					ROADWAY SUBTOTAL	**$90,300**
		DRAINAGE				
		15% TOTAL COST FOR DRAINAGE, EROSION CONTROL, AND BMP ELEMENTS		LUMP	$54,990.00	$0
					DRAINAGE SUBTOTAL	**$0**
		PAVEMENT				
		FULL DEPTH PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	2,871	SQ YD	$50.15	$143,964
		RESURFACING - ASPHALT				
		RESURFACING	18,245	SQ YD	$7.25	$132,274
		FULL DEPTH PAVEMENT - CONCRETE				
		CONCRETE PAVEMENT BUILD-UP	2,871	SQ YD	$101.67	$291,861
					PAVEMENT SUBTOTAL	**$276,300**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	0	LUMP	$80,000.00	$0
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$0**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	0	LUMP	$60,000.00	$0
					TRAFFIC CONTROL SUBTOTAL	**$0**
		LIGHTING				
		LIGHTING LUMP SUM	0	LUMP	$35,000.00	$0
					LIGHTING SUBTOTAL	**$0**
		STRUCTURES				
		RETAINING WALLS	0	SQ FT	$130.00	$0
					STRUCTURES SUBTOTAL	**$0**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	0	MONTH	$0.00	$0
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	0	LUMP	$0.00	$0
624	10000	MOBILIZATION	0	LUMP	$0.00	$0
					CONSTRUCTION MISC. SUBTOTAL	**$0**
					CONSTRUCTION COST SUBTOTOAL	**$366,600**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$109,980**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$477,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2025)	10.0%			$47,700
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2025 DOLLARS				**$524,700**

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.

SUM-8-0.00 CORRIDOR STUDY

SR-8 NB PBPD - SUM-8 BRIDGE ADDITIONAL COSTS
COST ESTIMATE (1/6/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED	2,162	SQ YD	$8.75	$18,919
203	10000	EXCAVATION	1,296	CU YD	$12.50	$16,204
203	20000	EMBANKMENT	926	CU YD	$9.00	$8,333
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	120	FT	$110.00	$13,200
609	24000	CURB, TYPE 4	2,900	FT	$15.00	$43,500
					ROADWAY SUBTOTAL	**$100,200**
		DRAINAGE				
		15% TOTAL COST FOR DRAINAGE, EROSION CONTROL, AND BMP ELEMENTS	1	LUMP	$52,740.00	$52,740
					DRAINAGE SUBTOTAL	**$52,800**
		PAVEMENT				
		FULL DEPTH PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	2,818	SQ YD	$50.15	$141,312
					PAVEMENT SUBTOTAL	**$141,400**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	1	LUMP	$40,000.00	$40,000
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$40,000**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	1	LUMP	$15,000.00	$15,000
					TRAFFIC CONTROL SUBTOTAL	**$15,000**
		LIGHTING				
		LIGHTING LUMP SUM	1	LUMP	$55,000.00	$55,000
					LIGHTING SUBTOTAL	**$55,000**
		STRUCTURES				
		RETAINING WALLS	0	SQ FT	$130.00	$0
					STRUCTURES SUBTOTAL	**$0**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	0	MONTH	$0.00	$0
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	0	LUMP	$0.00	$0
624	10000	MOBILIZATION	0	LUMP	$0.00	$0
					CONSTRUCTION MISC. SUBTOTAL	**$0**
					CONSTRUCTION COST SUBTOTOAL	**$404,400**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$121,320**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$526,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2025)	10.0%			$52,600
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2025 DOLLARS				**$578,600**

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.

SUM-8-0.00 CORRIDOR STUDY

SR-8 SB PBPD - SUM-8 BRIDGE ADDITIONAL COSTS
COST ESTIMATE (4/10/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED	3,296	SQ YD	$8.75	$28,844
203	10000	EXCAVATION	1,296	CU YD	$12.50	$16,204
203	20000	EMBANKMENT	926	CU YD	$9.00	$8,333
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	150	FT	$110.00	$16,500
609	24000	CURB, TYPE 4	1,250	FT	$15.00	$18,750
					ROADWAY SUBTOTAL	**$88,700**
		DRAINAGE				
		15% TOTAL COST FOR DRAINAGE, EROSION CONTROL, AND BMP ELEMENTS	1	LUMP	$50,070.00	$50,070
					DRAINAGE SUBTOTAL	**$50,100**
		PAVEMENT				
		FULL DEPTH PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	3,092	SQ YD	$50.15	$155,047
					PAVEMENT SUBTOTAL	**$155,100**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	1	LUMP	$40,000.00	$20,000
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$20,000**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	1	LUMP	$15,000.00	$15,000
					TRAFFIC CONTROL SUBTOTAL	**$15,000**
		LIGHTING				
		LIGHTING LUMP SUM	1	LUMP	$55,000.00	$55,000
					LIGHTING SUBTOTAL	**$55,000**
		STRUCTURES				
		RETAINING WALLS	0	SQ FT	$130.00	$0
					STRUCTURES SUBTOTAL	**$0**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	0	MONTH	$0.00	$0
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	0	LUMP	$0.00	$0
624	10000	MOBILIZATION	0	LUMP	$0.00	$0
					CONSTRUCTION MISC. SUBTOTAL	**$0**
					CONSTRUCTION COST SUBTOTOAL	**$383,900**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$115,170**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$500,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2025)	10.0%			$50,000
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2025 DOLLARS				**$550,000**

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.

SUM-8-0.00 CORRIDOR STUDY

SR-8 NB PBPD - CI WIDENING ADDITIONAL COSTS
COST ESTIMATE (4/10/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED	362	SQ YD	$8.75	$3,169
203	10000	EXCAVATION	8,124	CU YD	$12.50	$101,554
203	20000	EMBANKMENT	717	CU YD	$9.00	$6,456
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	500	FT	$110.00	$55,000
609	24000	CURB, TYPE 4	2,000	FT	$15.00	$30,000
					ROADWAY SUBTOTAL	**$196,200**
		DRAINAGE				
		DRAINAGE LUMP SUM	1	LUMP	$65,000.00	$65,000
					DRAINAGE SUBTOTAL	**$65,000**
		PAVEMENT				
		FULL DEPTH PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	5,389	SQ YD	$50.15	$270,281
					PAVEMENT SUBTOTAL	**$270,300**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	1	LUMP	$50,000.00	$50,000
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$50,000**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	1	LUMP	$30,000.00	$30,000
					TRAFFIC CONTROL SUBTOTAL	**$30,000**
		LIGHTING				
		LIGHTING LUMP SUM	0	LUMP	$0.00	$0
					LIGHTING SUBTOTAL	**$0**
		STRUCTURES				
		RETAINING WALLS	0	SQ FT	$130.00	$0
					STRUCTURES SUBTOTAL	**$0**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	0	MONTH	$0.00	$0
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	0	LUMP	$0.00	$0
624	10000	MOBILIZATION	0	LUMP	$0.00	$0
					CONSTRUCTION MISC. SUBTOTAL	**$0**
					CONSTRUCTION COST SUBTOTOAL	**$611,500**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$183,450**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$795,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2025)	10.0%			$79,500
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2025 DOLLARS				**$874,500**

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.

SUM-8-0.00 CORRIDOR STUDY

SR-8 SB - CARROL SB RAMP BRAID (W/ PBPD)
COST ESTIMATE (1/8/2020)

ITEM	ITEM EXTENSION	DESCRIPTION	TOTAL QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE (2018 dollars)
		ROADWAY				
202	23000	PAVEMENT REMOVED	22,000	SQ YD	$8.75	$192,500
203	10000	EXCAVATION	22,000	CU YD	$12.50	$275,000
203	20000	EMBANKMENT	70,000	CU YD	$9.00	$630,000
622	90000	BARRIER, MISC.: VARIOUS CONCRETE BARRIER	5,000	FT	$110.00	$550,000
					ROADWAY SUBTOTAL	**$1,647,500**
		DRAINAGE				
		15% TOTAL COST FOR DRAINAGE, EROSION CONTROL, AND BMP ELEMENTS	1	LUMP	$2,972,820.00	$2,972,820
					DRAINAGE SUBTOTAL	**$2,972,900**
		PAVEMENT				
		PAVEMENT - ASPHALT				
		ASPHALT PAVEMENT BUILD-UP	30,000	SQ YD	$50.15	$1,504,500
		FULL DEPTH PAVEMENT - CONCRETE				
		CONCRETE PAVEMENT BUILD-UP	30,000	SQ YD	$101.67	$3,050,100
					PAVEMENT SUBTOTAL	**$1,504,500**
		MAINTENTANCE OF TRAFFIC				
		MAINTENTANCE OF TRAFFIC LUMP SUM	1	LUMP	$1,500,000.00	$1,500,000
					MAINTENANCE OF TRAFFIC SUBTOTAL	**$1,500,000**
		TRAFFIC CONTROL				
		SIGNING AND PAVEMENT MARKINGS LUMP SUM	1	LUMP	$300,000.00	$300,000
					TRAFFIC CONTROL SUBTOTAL	**$300,000**
		LIGHTING				
		LIGHTING LUMP SUM	1	LUMP	$400,000.00	$200,000
					LIGHTING SUBTOTAL	**$200,000**
		STRUCTURES				
		BEACON STREET BRIDGE WIDENING	8800	SQ FT	$200.00	$1,760,000
		EXCHANGE STREET BRIDGE WIDENING	1000	SQ FT	$200.00	$200,000
		NEW EXCHANGE STREET BRIDGE	8300	SQ FT	$200.00	$1,660,000
		NEW RAMP BRAID BRIDGE	8430	SQ FT	$200.00	$1,686,000
		NEW JOHNSTON STREET BRIDGE	15100	SQ FT	$200.00	$3,020,000
		RETAINING WALLS	38000	SQ FT	$130.00	$4,940,000
		NOISE WALLS	3400	LF	$412.00	$1,400,800
					STRUCTURES SUBTOTAL	**$14,666,800**
		CONSTRUCTION MISC.				
619	16020	FIELD OFFICE, TYPE C	18	MONTH	$2,500.00	$45,000
623	10000	CONSTRUCTION LAYOUT STAKES (0.75% of Total)	1	LUMP	$170,937.75	$170,938
624	10000	MOBILIZATION	1	LUMP	$1,200,000.00	$800,000
					CONSTRUCTION MISC. SUBTOTAL	**$1,016,000**
					CONSTRUCTION COST SUBTOTOAL	**$23,807,700**
		COST CONTINGENCY - PRELIMINARY ENGINEERING (30%)				**$7,142,310**
		TOTAL CONSTRUCTION COST, 2018 DOLLARS				**$30,951,000**
		CONSTRUCTION COST INFLATION RATE (2018 to 2030)	35.0%			$10,832,850
		TOTAL CONSTRUCTION COST IN CONSTRUCTION YEAR, 2030 DOLLARS				**$41,790,000**
		DESIGN FEE (APPROXIMATELY 10% OF CONSTRUCTION COST)				**$4,180,000**

- ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT OF WAY ACQUISITIONS OR UTILITY RELOCATIONS.