

Date: April 25, 2023

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Subject: **Project Traffic Analysis Memorandum**
SR 408 from Kirkman Road to Church Street PD&E Study (Project # 408-174)

1.0 Overview

1.1 Background

The Central Florida Expressway Authority (CFX) improved SR 408 mainline between 2003 and 2010 with a major widening project from Hiawassee Road to Oxalis Avenue, and again in 2011 through 2013 with a major widening from Oxalis Avenue to SR 417. Currently, CFX has two design projects that include capacity improvements on SR 408 mainline from Church Street to I-4, and completion of the Tampa Avenue interchange to add ramps to/from the east (#408-315 & 408-315A). Completion of the Tampa Avenue interchange is a partnership project with the City of Orlando. The CFX is also conducting a Project Development and Environment (PD&E) study to evaluate capacity improvements between Kirkman Road (SR 435) and Church Street (#408-174). In addition, another PD&E study is underway to evaluate improvements in the westbound direction of SR 408 between I-4 and Goldenrod Road (#408-175).

This Project Traffic Analysis Memorandum is prepared to support the PD&E study from Kirkman Road to Church Street (#408-174). The PD&E study is evaluating improvements to address existing and future capacity needs within the project limits. This memorandum provides existing conditions data, future traffic forecasts, and operational analysis results for the 2022 existing, 2025 opening and 2045 design year conditions. Historical crash data analysis is also included.

1.2 Analysis Area of Influence

The project is located in Orange County in Central Florida and extends from Kirkman Road to Church Street, as shown in **Figure 1.1**. The anticipated analysis Area of Influence (AOI) is depicted in **Figure 1.2** and includes the following existing facilities:

- SR 408 mainline segments and interchanges
 - Kirkman Road
 - Pine Hills Road
 - Old Winter Garden Road
 - John Young Parkway

**Figure 1.1
Project Location**

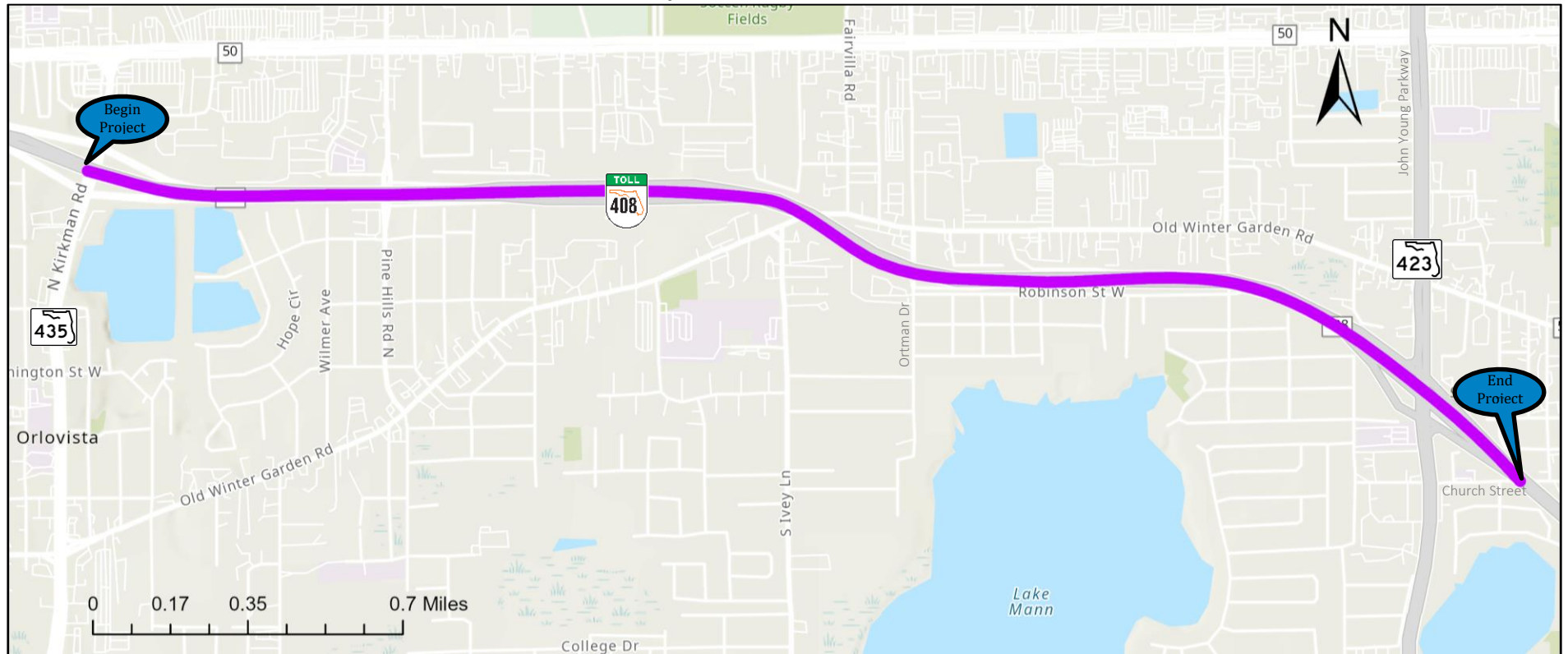
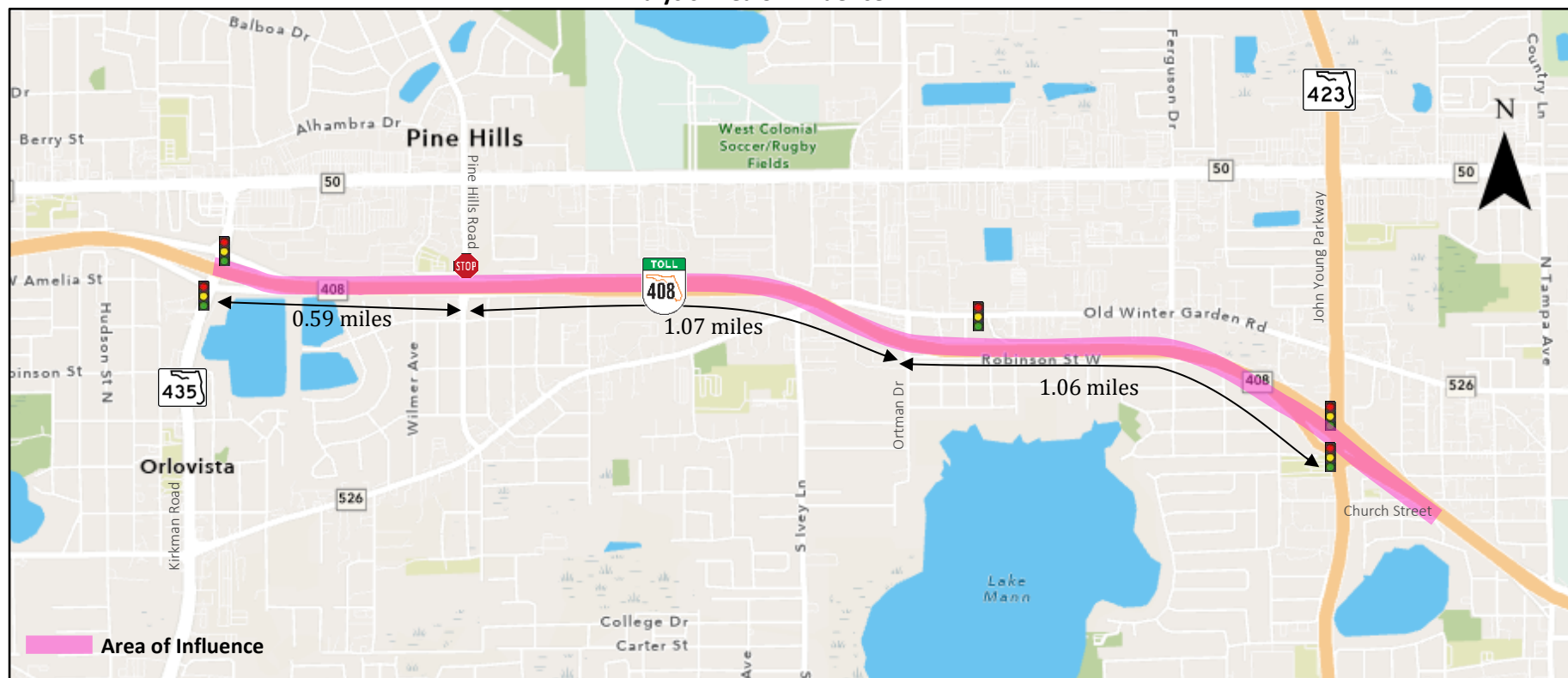


Figure 2.2
Analysis Area of Influence



- Kirkman Road and SR 408 ramp terminal intersections
- Pine Hills Road and SR 408 westbound ramp terminal intersection
- Old Winter Garden Road and SR 408 westbound ramp terminal intersection
- John Young Parkway and SR 408 ramp terminal intersections

1.3 Operational Analysis Methodology

The analysis documented in this memorandum was conducted for the 2022 existing, 2025 opening and 2045 design years. Freeway segments (basic and merge/diverge) analysis was based on the capacity targets published in the 2020 Florida Department of Transportation (FDOT) Quality and Level of Service (LOS) Handbook. The FDOT capacity targets were adjusted for local conditions such as speed, truck proportion and Peak Hour Factor (PHF).

The Highway Capacity Software (HCS) Version 7.9 was used to identify LOS along freeway segments. The analysis was based on the FDOT Traffic Analysis Handbook and followed the Highway Capacity Manual (HCM) 6th Edition methodologies. The HCM estimates LOS based on density – a function of flow rate (volumes) and travel speed – for uninterrupted flow facilities such as basic freeway/Collector-Distributor (C-D) roadway segments, merge and diverge segments, and freeway/C-D roadway weaving segments. Density is measured in passenger cars per mile per lane (pcpmpl). The HCM 6th Edition LOS and density thresholds for freeway segments are listed in **Table 1.1**.

Table 1.1
Freeway Segments HCM 6th Edition Level of Service Criteria

LOS	Basic	Merge and Diverge
	Exhibit 12-15	Exhibit 14-3
A	≤ 11	≤ 10
B	> 11-18	> 10-20
C	> 18-26	> 20-28
D	> 26-35	> 28-35
E	> 35-45	> 35
F	Demand exceeds capacity or density >45	Demand exceeds capacity

Since the default capacity in the HCS is high, it was adjusted to a realistic level using the FDOT capacity target that was modified for local conditions. Tests were conducted using the following parameters and assumptions for SR 408 to determine a factor for adjusting capacity and speed:

- SR 408 Free-Flow Speed (FFS) = 65 mph
- SR 408 Design Hour Truck (DHT) percentage = 2%
- Lane width = 12 feet
- Right shoulder clearance = 6 feet
- Driver population = Mostly familiar

- Weather Type = Non-Severe Weather
- Incident Type = No incident
- Demand Adjustment Factor = 1.00

A capacity and speed adjustment factor of 0.953 was determined.

For freeway merge and diverge areas, the HCM methodology also includes a capacity check for the influence area and the upstream or downstream ramp roadway. Capacity is dependent upon FFS and number of lanes. The analysis for ramp roadways was based on LOS E targets from the HCM 6th Edition. HCM capacity targets for ramp roadways are shown in **Table 1.2**. Similar to freeway segments capacities, the HCM ramp roadway capacities were also adjusted for local conditions.

Table 1.2
Ramp Roadway Capacity HCM 6th Edition Level of Service Criteria

Ramp FFS	Single-Lane Ramps	Two-Lane Ramps
(HCM Exhibit 14-12)		
> 50	2,200	4,400
> 40-50	2,100	4,200
> 30-40	2,000	4,000
≥ 20-30	1,900	3,800
< 20	1,800	3,600

Intersections were evaluated using Synchro Version 11, based on the HCM 6th Edition LOS and the delay targets presented in **Tables 1.3** and **1.4**. Unlike the HCM, Synchro has additional procedures for estimating control delay, such as estimation of right turn on red and queue delay associated with starvation and spillback. Thus, Synchro is expected to yield more accurate results for intersections than HCM because of these additional refinements.

Table 1.3
Signalized Intersection HCM 6th Edition Level of Service Criteria

Control Delay (s/veh)	LOS by Volume-to-Capacity Ratio*	
	≤1.0	>1.0
(HCM Exhibit 19-8)		
≤10	A	F
>10-20	B	F
>20-35	C	F
>35-55	D	F
>55-80	E	F
>80	F	F

*For approach-based and intersectionwide assessments, LOS is defined solely by control delay.

Table 1.4
Unsignalized Intersection HCM 6th Edition Level of Service Criteria

Control Delay (s/veh)	LOS by Volume-to-Capacity Ratio*	
	≤1.0	>1.0
(HCM Exhibit 20-2)		
0-10	A	F
>10-15	B	F
>15-25	C	F
>25-35	D	F
>35-50	E	F
>50	F	F

* The LOS criteria apply to each lane on a given approach and to each approach on the minor street.
LOS is not calculated for major-street approaches or for the intersection as a whole.

Queue lengths were estimated using SimTraffic, the microsimulation companion of Synchro, to better account for vehicle interactions. SimTraffic analysis was based on a 30-minute seeding period and two hours of simulation.

2.0 Existing Conditions

2.1 Roadway Facilities

SR 408 is an east-west limited access toll facility which begins at the Florida's Turnpike (SR 91) system-to-system interchange in the west and terminates just west of the Colonial Drive (SR 50) partial clover leaf interchange in the east. Within the project limits from Kirkman Road to Church Street, the posted speed limit is 60 mph.

Kirkman Road is a six-lane, divided urban principal arterial which runs north-south. It starts at Sand Lake Road to (SR 482) the south, intersects with major roadways such as Interstate 4 (I-4), SR 408 and terminates at Colonial Drive (SR 50). Kirkman Road forms a diamond interchange with SR 408 and all the ramps are non-tolled. The posted speed limit on Kirkman Road within the study limits is 45 mph.

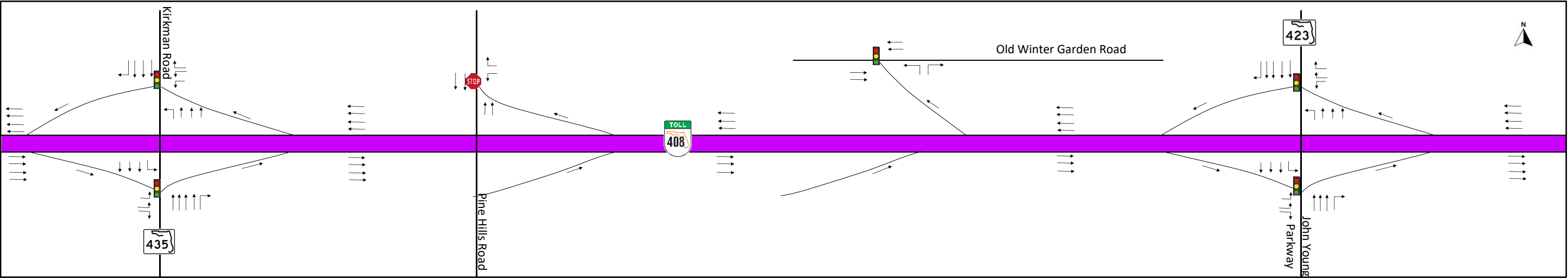
Pine Hills Road is a north-south major collector with a speed limit of 40 mph to the south and 35 mph to the north of the SR 408 interchange. It forms a partial diamond interchange at SR 408 with access to and from the east only. Both ramps are tolled.

Old Winter Garden Road is a four-lane, divided, east-west minor arterial. The roadway has accesses to and from the east of SR 408 and both ramps are tolled. Within the area of influence, the posted speed limit is 45 mph.

John Young Parkway is a six-lane, north-south urban principal arterial. The roadway forms a diamond interchange with SR 408. The ramps to and from the east are tolled and the ramps to and from the west are non-tolled. The posted speed limit on John Young Parkway within the area of influence is 45 mph.

The existing conditions lane geometry is depicted in **Figure 2.1**. Lane geometry information was obtained from high resolution aerial maps and field reviews.

Figure 3.1
2022 (Existing) Lane Geometry



2.2 Data Collection

Daily hose and intersection movement counts were collected at the locations listed in **Table 2.1**. Traffic volumes for the SR 408 mainline and tolled ramps were obtained from toll transactions data and non-tolled ramps from roadway sensor data and hose counts. All data collection was conducted in accordance with the procedures from the latest edition of the FDOT Manual on Uniform Traffic Studies, FDOT Manual Number 750-020-007. All counts were collected in December 2022. The study area AM and PM peak hour volumes were calculated using data for the four highest consecutive 15-minute periods in the morning and evening at each count location. Growth, seasonal, and axle adjustment factors were applied to the data where applicable. The traffic data were balanced and adjusted for continuity of flow. The final 2022 AM and PM peak hour volumes are summarized in **Figures 2.2 and 2.3**. Signal timing data were provided by the Orange County.

Table 2.1
Traffic Count Locations

Hose Count Locations
John Young Parkway westbound on-ramp to SR 408
John Young Parkway eastbound on-ramp to SR 408
Kirkman Road westbound off-ramp from SR 408
Kirkman Road eastbound on-ramp to SR 408
Pine Hills Road westbound off-ramp from SR 408
Pine Hills Road eastbound on-ramp to SR 408
Intersection Count Locations
Kirkman Road and SR 408 Westbound Ramps
Kirkman Road and SR 408 Eastbound Ramps
Pine Hills Road and SR 408 Westbound Off-ramp
Old Winter Garden Road and SR 408 Westbound Off-ramp
John Young Parkway and SR 408 Westbound Ramps
John Young Parkway and SR 408 Eastbound Ramps

All counts were collected in December 2022

Figure 4.2
2022 AM (Existing) Peak Hour Volumes

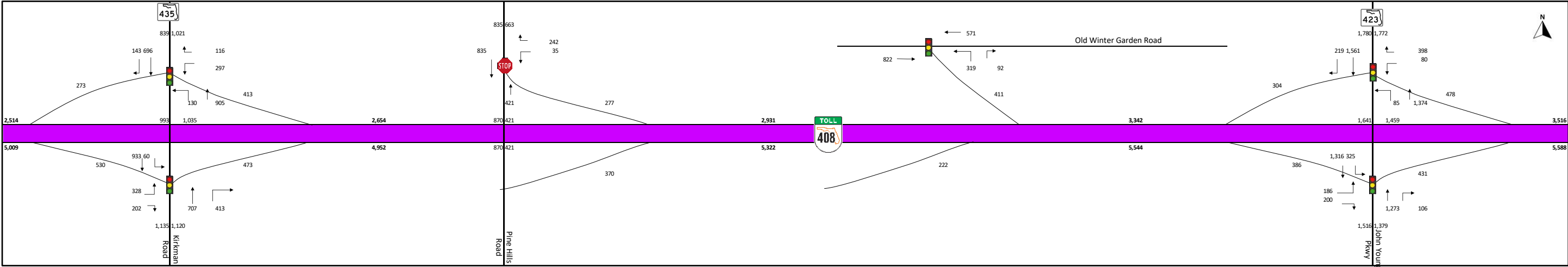
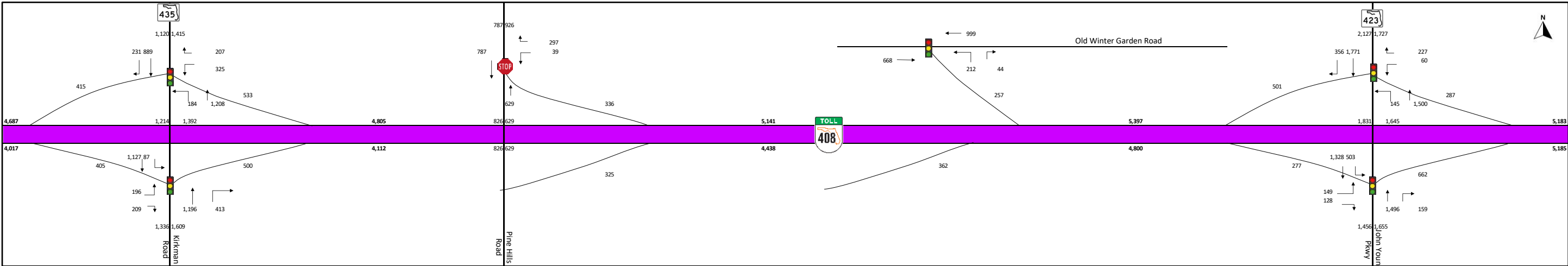


Figure 5.3
2022 PM (Existing) Peak Hour Volumes



2.3 Existing Conditions Traffic Operations

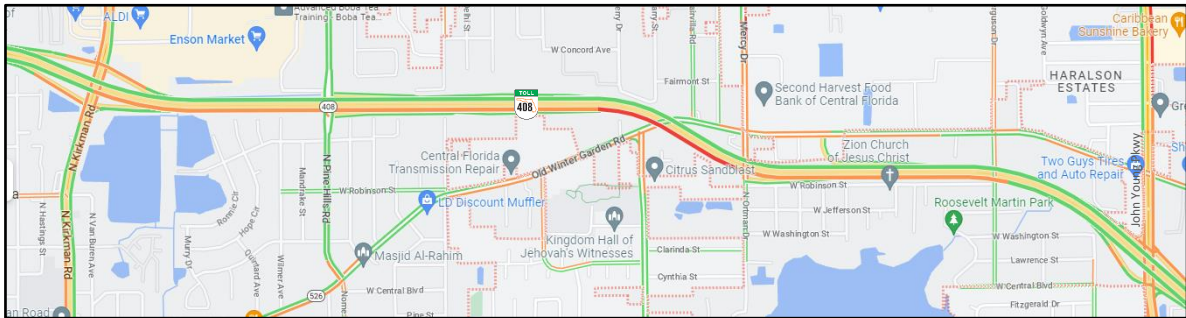
This section provides a summary of traffic performance results for existing conditions. Detailed output reports and analysis files are provided in **Appendix A**. The section of SR 408 mainline within the study limits was evaluated using the HCS Version 7.9. As shown in **Table 2.2**, the segments currently operate at an acceptable LOS D or better during both the AM and PM peak hours, except for the eastbound three-lane basic segment between Old Winter Garden Road and John Young Parkway which operates at an unacceptable LOS E in the AM conditions.

It's important to note that the HCS is a deterministic analysis tool and does not consider vehicle interactions and thus, in some cases, field operations are not correctly reflected in HCS results. For instance, field observations and Google typical speed maps show that the three-lane eastbound segment from Pine Hills Road on-ramp to John Young Parkway off-ramp is a congestion hotspot during the morning commute on weekdays. Merging traffic from the Pine Hills Road/cash lanes and Old Winter Garden Road/Ortman Drive on-ramps exacerbate congestion in this area. The HCS shows LOS C/D/E but based on field observations, vehicles operate at LOS F in this area and backups propagate upstream, as shown in **Figure 2.4**.

Table 2.2
2022 (Existing) Peak Hour Freeway Mainline Segment Operations

Segment	Segment Type	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
SR 408 Eastbound						
Kirkman Road off-ramp to on-ramp	Basic	3	4,479	3,612	D/26	C/21
Kirkman Road on-ramp to Pine Hills Road on-ramp	Merge	3+1Aux	4,952	4,112	C/23	B/19
Kirkman Road on-ramp to Pine Hills Road on-ramp	Basic	3+1Aux	4,952	4,112	C/22	B/18
Pine Hills Road on-ramp to Old Winter Garden Road on-ramp	Merge	3	5,322	4,438	C/26	C/21
Pine Hills Road on-ramp to Old Winter Garden Road on-ramp	Basic	3	5,322	4,438	D/34	C/26
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Merge	3	5,544	4,800	D/30	C/27
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Basic	3	5,544	4,800	E/36	D/29
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Diverge	3	5,544	4,800	D/31	C/27
John Young Parkway off-ramp to on-ramp	Basic	3	5,157	4,523	D/32	D/27
Downstream John Young Parkway on-ramp	Merge	3+1 Aux	5,588	5,185	C/26	C/25
SR 408 Westbound						
Upstream John Young Parkway off-ramp	Diverge	3+1 Aux	3,516	5,183	A/7	B/13
John Young Parkway off-ramp to on-ramp	Basic	3	3,038	4,896	B/18	D/30
John Young Parkway on-ramp to Old Winter Garden Road off-ramp	Weave	3+1 Aux	3,342	5,397	B/17	D/29
Old Winter Garden Road off-ramp to Pine Hills Road off-ramp	Basic	3	2,931	5,141	B/17	D/32
Old Winter Garden Road off-ramp to Pine Hills Road off-ramp	Diverge	3	2,931	5,141	B/11	C/22
Pine Hills Road off-ramp to Kirkman Road off-ramp	Basic	3+1 Aux	2,654	4,805	B/12	C/21
Pine Hills Road off-ramp to Kirkman Road off-ramp	Diverge	3+1 Aux	2,654	4,805	A/4	B/13
Kirkman Road off-ramp to on-ramp	Basic	3	2,241	4,272	B/13	C/25

Figure 2.4
2022 AM (Existing) Peak Period Google Typical Speed on SR 408



The analysis for ramp roadways was based on LOS E (capacity) targets from the HCM 6th Edition and adjusted for local conditions. Capacity on the ramp roadways was assessed by comparing it with existing demand. The ramp Volume-to-Capacity (V/C) analysis is summarized in **Table 2.3**. The results show that the ramps within the AOI have a V/C ratio of 0.4 or less in year 2022.

Table 2.3
2022 (Existing) Peak Hour Ramp Capacity Analysis

Interchange	Ramp	Lanes	Volume (vph)		Capacity (vph)	V/C	
			AM	PM		AM	PM
Existing							
Kirkman Road	Eastbound off-ramp	1	530	405	1,850	0.3	0.2
	Westbound on-ramp	1	273	415	1,850	0.1	0.2
	Eastbound on-ramp	1	473	500	1,850	0.3	0.3
	Westbound off-ramp	1	413	533	1,850	0.2	0.3
Pine Hills Road	Eastbound on-ramp	1	370	325	1,850	0.2	0.2
	Westbound off-ramp	1	277	336	1,850	0.1	0.2
Old Winter Garden Road	Eastbound on-ramp	1	222	362	1,850	0.1	0.2
	Westbound off-ramp	1	411	257	1,850	0.2	0.1
John Young Parkway	Eastbound off-ramp	1	386	277	1,850	0.2	0.1
	Westbound on-ramp	1	304	501	1,850	0.2	0.3
	Eastbound on-ramp	1	431	662	1,850	0.2	0.4
	Westbound off-ramp	1	478	287	1,850	0.3	0.2

The intersection LOS and delay was evaluated using the Synchro software, Version 11. Queue lengths were estimated using SimTraffic. The analysis results for the 2022 AM and PM peak hours are summarized in **Table 2.4**. Detailed Synchro/SimTraffic output reports are provided in **Appendix A**. The results show that all intersections are currently operating at an acceptable LOS D or better within the area of influence, in both the AM and PM peak hours.

Table 2.4
2022 Existing AM and PM Peak Hour Intersection LOS/Delay (sec)

Intersection	Approach	Movement	LOS	Delay (Seconds)	Maximum Queue Length (Feet)*	Available Storage Length (Feet)
			AM (PM)	AM (PM)	AM (PM)	
Kirkman Road and SR 408 Eastbound Ramps	Eastbound	Left	F (E)	80.7 (75.4)	281 (209)	300
		Through	-	-	-	-
		Right	B (B)	11.8 (12.7)	150 (150)	300
	Northbound	Left	-	-	-	-
		Through	B (B)	11.5 (14.6)	211 (294)	-
		Right	A (A)	2.0 (2.0)	93 (201)	250
	Southbound	Left	F (E)	131.3 (69.4)	155 (203)	530
		Through	B (C)	12.0 (19.8)	233 (265)	-
		Right	-	-	-	-
	Overall Intersection		C (B)	21.5 (19.8)		
Kirkman Road and SR 408 Westbound Ramps	Westbound	Left	E (F)	74.6 (85.9)	263 (312)	400
		Through	-	-	-	-
		Right	B (B)	11.8 (12.7)	90 (189)	400
	Northbound	Left	E (F)	55.7 (89.5)	212 (332)	530
		Through	B (A)	17.5 (6.8)	243 (180)	-
		Right	-	-	-	-
	Southbound	Left	-	-	-	-
		Through	C (B)	20.8 (17.7)	298 (348)	-
		Right	A (A)	3.1 (2.5)	174 (206)	300
	Overall Intersection		C (C)	26.9 (23.5)	-	-
Pine Hills Road and SR 408 Westbound Ramps	Westbound	Left	C (C)	18.9 (24.3)	81 (91)	350
		Through	-	-	-	-
		Right	B (B)	11.6 (14.5)	110 (129)	-
	Northbound	Left	-	-	-	-
		Through	A (A)	0.0 (0.0)	0 (0)	-
		Right	-	-	-	-
	Southbound	Left	-	-	-	-
		Through	A (A)	0.0 (0.0)	0 (0)	-
		Right	-	-	-	-
	Overall Intersection		A (A)	2.3 (3.0)		
Old Winter Garden Road and SR 408 Westbound Ramps	Eastbound	Left	-	-	-	-
		Through	A (A)	9.9 (6.3)	240 (195)	-
		Right	-	-	-	-
	Westbound	Left	-	-	-	-
		Through	A (A)	8.9 (7.3)	184 (232)	-
		Right	-	-	-	-
	Northbound	Left	E (E)	69.0 (78.8)	443 (346)	1,000
		Through	-	-	-	-
		Right	A (B)	8.3 (13.9)	93 (59)	-
	Overall Intersection		B (B)	20.0 (15.0)	-	-
John Young Parkway and SR 408 Eastbound Ramps	Eastbound	Left	E (F)	71.4 (90.5)	141 (189)	450
		Through	-	-	-	-
		Right	E (C)	70.5 (30.0)	238 (122)	-
	Northbound	Left	-	-	-	-
		Through	C (C)	22.0 (30.3)	426 (486)	-
		Right	A (A)	5.5 (8.3)	45 (217)	250
	Southbound	Left	E (F)	70.4 (147.5)	359 (363)	780
		Through	A (A)	4.1 (3.0)	89 (180)	-
		Right	-	-	-	-
	Overall Intersection		C (D)	24.7 (37.8)		
John Young Parkway and SR 408 Westbound Ramps	Westbound	Left	E (F)	69.6 (93.9)	198 (158)	500
		Through	-	-	-	-
		Right	E (D)	60.5 (49.9)	204 (158)	500
	Northbound	Left	B (D)	15.1 (47.8)	166 (238)	430
		Through	A (A)	1.4 (1.0)	121 (75)	-
		Right	-	-	-	-
	Southbound	Left	-	-	-	-
		Through	B (B)	13.3 (15.3)	207 (2280)	-
		Right	A (A)	1.8 (1.8)	180 (173)	250
	Overall Intersection		B (B)	14.5 (13.1)	-	-

*SimTraffic maximum queue length

2.3 Existing Conditions Safety

Crash data for SR 408 were processed from 2017 through 2022 from the Signal Four Analytics tool, the FDOT's official crash data repository. The data was reviewed for accuracy and updated where applicable.

A total of 529 crashes were reported on SR 408 between Kirkman Road and Church Street from 2017 to 2022. There was an increase in the number of crashes from 2017 to 2018, a slight reduction in 2019, a significant reduction in 2020 due to COVID impacts and an increase in 2021 and 2022, as shown on **Figure 2.5**. On average, 96 crashes were reported per year, excluding 2020. A review of the hourly crash distribution showed that approximately 26 percent of the crashes occurred between 7 AM and 9 AM. The data did not provide directional distribution but, it's likely that most of the AM crashes occurred in the eastbound peak direction.

Figure 2.5
Number of Crashes by Year

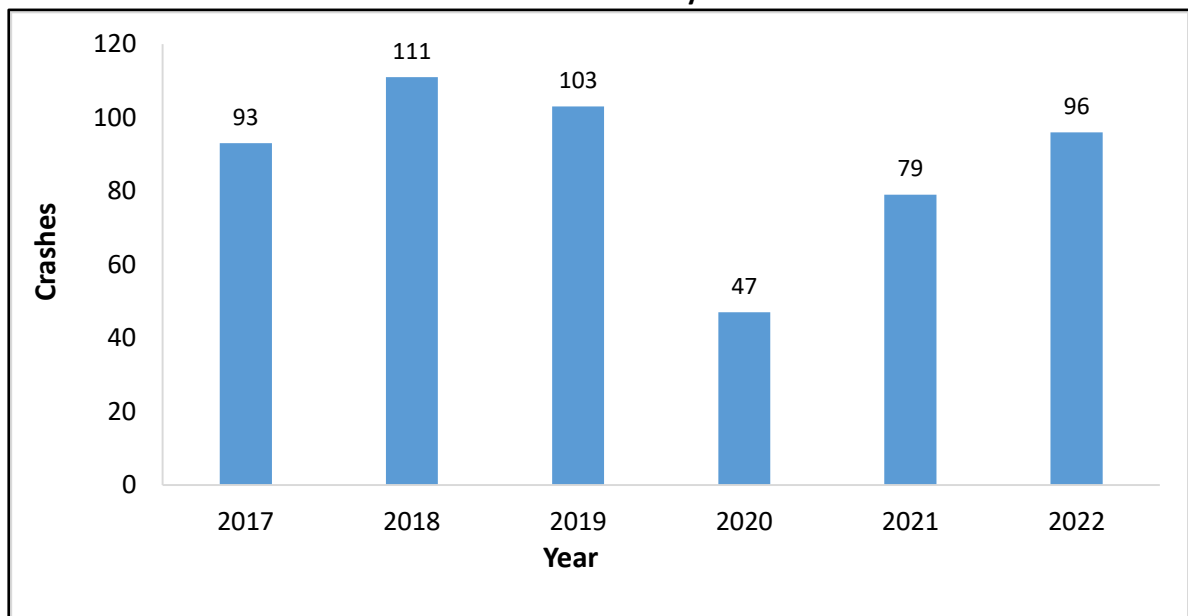
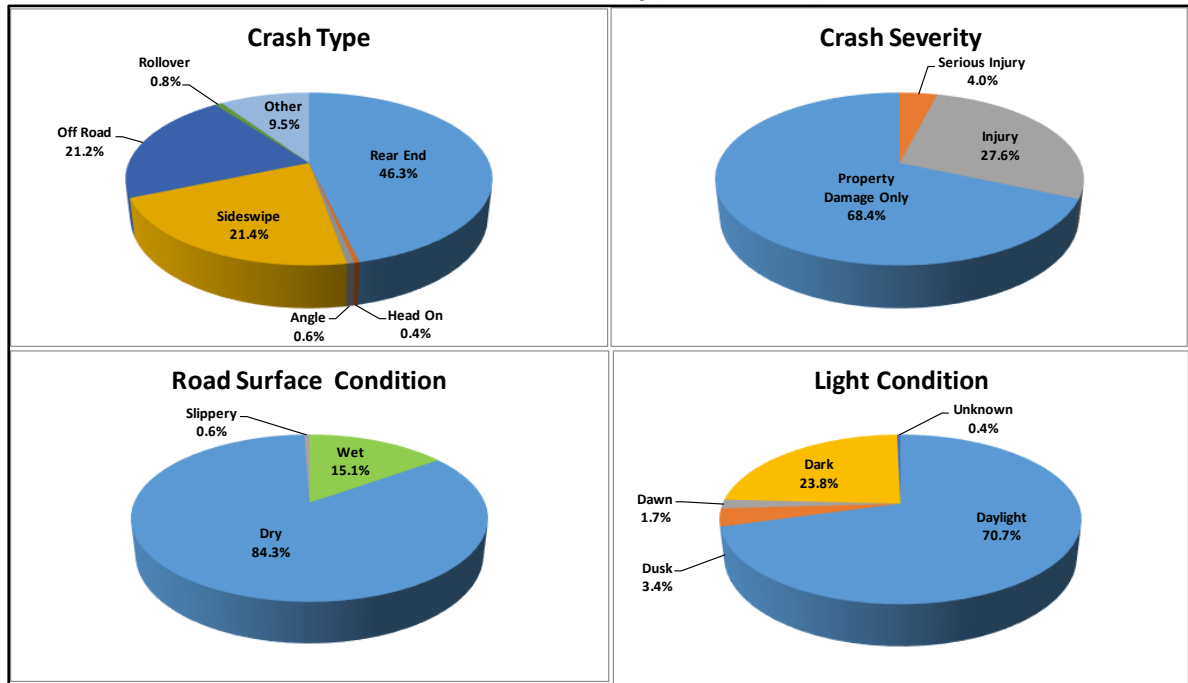


Figure 2.6 summarizes the crashes by type, severity, road surface and light conditions. The data shows that most of the crash types were rear end (46.3 percent) and sideswipe (21.4 percent). These crash types are typical of congested roadway segments with stop-and-go conditions, such as the section of SR 408 evaluated, mainly in the eastbound direction during the morning commute between Pine Hills Road on-ramp and John Young Parkway off-ramp. Most of the crashes resulted in property damage only (68.4 percent) and injury (27.6 percent) but there were a few serious injuries (4.0 percent). No fatal crashes occurred during the study period in the project area. Most of the crashes occurred under dry conditions during the day.

Figure 2.6
Crashes Data Summary (2017 – 2022)



Actual crash rate for the SR 408 mainline from Kirkman Road and Church Street was computed and compared with the average crash rate for similar facilities within Orange County to assess the safety condition within the study area. Critical crash rate and safety ratio were also estimated. The crash rate for the SR 408 freeway was calculated as crashes per Million Vehicle Miles Travelled (MVMT). The critical crash rate is based on the average crash rate for a similar facility adjusted by vehicle exposure and a probability constant. The safety ratio represents the actual crash rate divided by the critical crash rate. If a segment has an actual crash rate higher than the critical crash rate (i.e., safety ratio > 1.0), it may have a safety deficiency. As shown in **Table 2.5**, the safety ratio for the SR 408 mainline within the study limits is 0.76, indicating that this is not necessarily a high crash location.

Table 2.5
SR 408 Crash Rate and Safety Ratio for 2017 through 2022, excluding 2020

Description	Total Crashes**	Actual Crash Rate	Average Crash Rate*	Critical Crash Rate	Safety Ratio
SR 408 Mainline					
Kirkman Road to Church Street	482	0.59	0.63	0.78	0.76

* FDOT CAR Orange County, 5-year Average Crash Rate
Toll Road Urban

**Excludes 2020

3.0 Future Conditions

3.1 Travel Demand Model

A summary of the travel demand model development is provided in this section. Additional details are provided in **Appendix B**.

The FDOT District 5 Central Florida Regional Planning Model (CFRPM) - version 6.1 - was used as the basis for this study. This model had been previously used to create a CFX project-specific version for the SR 414 Expressway Extension PD&E study, *CFX Model 414*, that was used as a starting point for the SR 408 study. A project-specific travel demand model with a 2017 base year was created for the entire SR 408 corridor and named *CFX Model 408*. The model study area is shown in **Figure 3.1**.

3.1.1 2017 Base Year Model Validation

The base year network and Traffic Analysis Zone (TAZ) structure was used and compared with the newly released CFRPM v7. The zones along the SR 408 corridor were reviewed and updated based on the CFRPM v7 model zonal structure, with the disaggregation of only two zones. A map of the adjusted zones is shown in **Figure 3.2**. The zone splits were located in downtown Orlando. The other network updates in the downtown area were shifts in the centroid locations and loading links based on existing development.

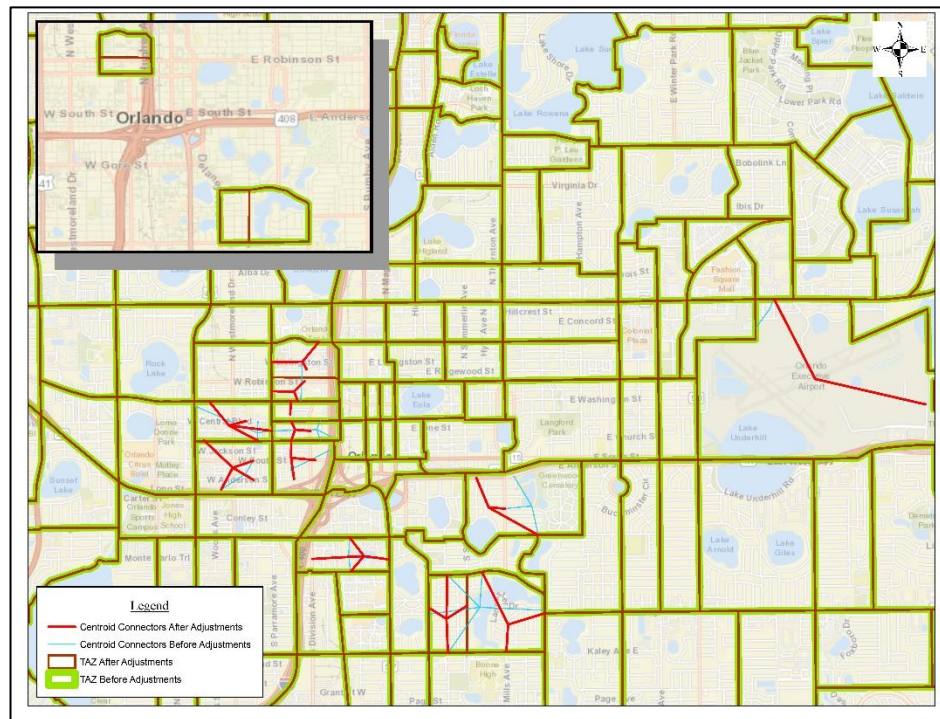
The 2017 socioeconomic (SE) data were updated for the disaggregated zones by dividing the original zonal data by area of the new zones. The SE data appeared to be reasonable compared to the existing land uses observed in the Google Earth aerial photography from December 2017. In addition, there were adjustments made to TAZ SE datasets to reflect zonal splits from a previous project, the Andes Avenue Extension Feasibility Study, where the SE data sets were not carried forward. These updates were concentrated near the SR 408 and SR 417 interchange area, where larger zones were disaggregated but the SE data was inconsistent. Overall, the network and zonal adjustments were completed to improve trip distribution in these developed areas and ensure better loading of traffic to the network and SR 408. Using GIS and 2017 aerial imagery, the network facility types, number of lanes on roadway segments and intersection approaches, speeds and capacities on facilities that parallel and feed SR 408 were checked, to ensure that the network was properly coded to match existing conditions.

Model link volumes were compared to observed counts. The comparison revealed that there were several instances where the observed counts were mis-coded in the model network, specifically on sections of I-4 and on the parallel facilities of South and Anderson Streets. The observed data were corrected where applicable. Further, several adjustments were made to the link attributes on I-4 and SR 408 including operating speed and capacity. For I-4, the section between SR 408 and Robinson Street, SR 50 and Princeton Street, and between Fairbanks Avenue and Maitland Boulevard were adjusted so that the posted speed was uniform throughout the corridor. The posted speeds in the *CFX Model 408* were increased by multiplying by a factor and used as the free-flow speeds in the assignment module. To ensure the posted speed on SR 408 was represented correctly, speed decrease adjustments of 10 percent were implemented on sections of SR 408 from John Young Parkway to I-4 and from Mills Avenue to Crystal Lake Drive, and speed increase adjustments of 10 percent on the section from Dean Road to Challenger Parkway.

Figure 3.1
Project-Specific Model Study Area



Figure 3.2
Base Year Zonal Structure Adjustments



2017 Base Year Model Validation Results

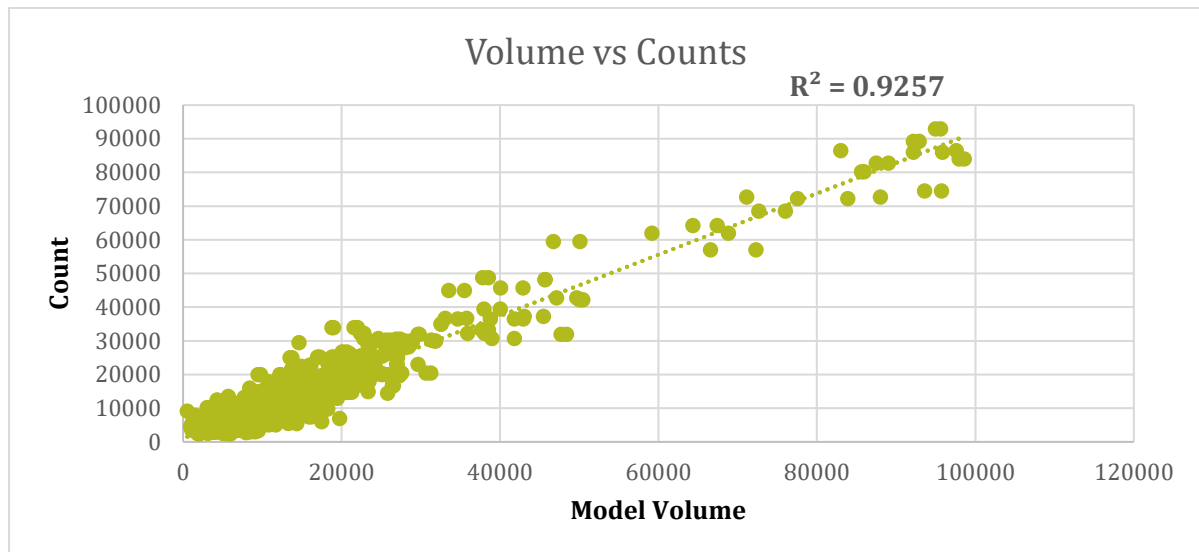
The final volume to count ratios by facility type are shown in **Table 3.1**. The overall volume to count ratio by facility type is 1.03 for the study area, with a deviation of 3.0 percent. Most of the facility type groups' deviations are within the acceptable range.

Table 3.1
2017 Base Year Model Volume to Count Ratio by Facility Type

Facility Type	Volume to Count Ratio	Deviation	Benchmarks	
			Preferable	Acceptable
Freeways	1.06	6%	+/- 6%	+/- 7%
Divided Arterials	0.95	-5%	+/- 10%	+/- 15%
Undivided Arterials	1.17	17%	+/- 10%	+/- 15%
Collectors	1.17	17%	+/- 20%	+/- 25%
One-Way Facilities	1.39	39%	+/- 20%	+/- 25%
Study Area	1.03	3%	+/- 15%	+/- 25%

The variance between base year model volumes and counts was calculated at a R-squared value of 0.9257, which is a close fit. The base year model scatter plot is shown in **Figure 3.3**.

Figure 3.3
2017 Base Year Model R² Scatter Plot



Percent Root Mean Squared Error (%RMSE) was calculated. It is a standard model validation check that measures the average error between the model-estimated volumes and the actual traffic counts. The lower the value, the less the error between the model-estimated volumes and the counts. The %RMSE stratified by volume groups is shown in **Table 3.2**. The overall %RSME of 32 percent is better than the target of 35-45 percent. Most of the volume groups fall within the acceptable %RSME range, with some groups performing better than the acceptable range.

Table 3.2
2017 Base Year Model %RMSE by Volume Group

Volume Group	Number of Links	Model Volume	Count	RMSE	%RMSE	Acceptable Range
<=5,000	95	322,698	460,400	2,659	54.9%	45%-100%
5,000-9,999 VPD	177	1,329,729	1,229,500	3,295	47.4%	35% - 45%
10,000-14,999 VPD	131	1,713,735	1,767,950	4,443	32.9%	27% - 35%
15,000-19,999 VPD	106	1,825,054	1,714,400	5,200	32.2%	25% - 30%
20,000-29,999 VPD	111	2,650,665	2,584,450	5,141	22.1%	15% - 27%
30,000-49,999 VPD	36	1,406,214	1,351,250	10,524	28.0%	15% -25%
50,000+ VPD	31	2,496,770	2,290,000	12,499	16.9%	10%-20%
Study Area	687	11,744,865	11,397,950	5,369.70	32%	35% - 45%

3.1.2 2025 Opening and 2045 Horizon Year Models

The opening and horizon model traffic forecast years were 2025 and 2045, respectively. The 2025 and 2045 future year models retained all the updates and enhancements from the 2017 base year model with additional adjustments to SE data (for zone disaggregation) and highway network to reflect future improvements in the study area.

Socioeconomic Forecasts

Independent socioeconomic forecasts of population, employment and school enrollment were developed by PFM (formerly Fishkind and Associates) for the entirety of Orange, Osceola and Lake Counties for various CFX expansion projects which were incorporated into this project model. PFM produced the forecasts at three levels (low, medium and high), consistent with the Bureau of Economic and Business Research (BEBR). **Tables 3.3** and **3.4** contain a summary of the medium SE data forecasts for the two counties relevant to the SR 408 corridor (Orange and Seminole) and the entire model. The long-term compound annual average growth rate in population, from 2017 to 2045, is 1.48% in Orange County, 0.83% in Seminole County and 1.49% for the entire model. The forecasted growth rate in employment is 1.61% in Orange County, 1.49% in Seminole County and 1.71% for the entire model.

Table 3.3
Population (1,000) Forecasts by County

County	2017	2025	Growth Rate (2017-2025)	2045	Growth Rate (2025-2045)	Growth Rate (2017-2045)
Orange	1,607.7	1,901.6	2.12%	2,423.1	1.22%	1.48%
Seminole	463.1	497.8	0.91%	584.1	0.80%	0.83%
Model Total	5,499.4	6,389.0	1.89%	8,313.6	1.33%	1.49%

Table 3.4
Employment (1,000) Forecasts by County

County	2017	2025	Growth Rate (2017-2025)	2045	Growth Rate (2025-2045)	Growth Rate (2017-2045)
Orange	924.0	1,130.8	2.56%	1,444.5	1.23%	1.61%
Seminole	261.7	300.3	1.74%	396.1	1.39%	1.49%
Model Total	2,456.3	2,935.4	2.25%	3,947.6	1.49%	1.71%

The only changes in the SE data forecasts for this project-specific model were for the disaggregated TAZ mentioned earlier. The SE data in the disaggregated zones were divided based on the percentage of land in each of the new zones as a proportion of the larger zone and evaluated and updated based on existing development and vacant developable land in the new zones. The analysis indicated that the area immediately adjacent to SR 408 is expected to have minimal changes, since it is already mostly built out. Most of the traffic growth is from outlying areas coming into downtown or passing through the area.

Future Year Highway Networks

The network changes in the base year network were carried over to the future year networks for consistency. The 2025 and 2045 future year highway networks in the study area were also reviewed for area and facility types, speeds, number of lanes and capacities, specifically the CFX facilities.

For the most part, the future year networks from the *CFX Model 414* were used in the *CFX Model 408*. The networks had been updated to incorporate link attributes revisions completed in the base year model and additional updates made to reflect planned improvements in the study area.

The future year networks in the model contain the transportation improvements identified in the CFX, FDOT and county work programs, as well as the improvements included in the cost feasible plan from Metroplan Orlando's Long-Range Transportation Plan for year 2040.

Tolls

CFX is the operator and developer of several toll roads in the Central Florida region, including SR 408. The "Customer First" toll policy was used for the inflation of toll rate inputs for 2025 and 2045. Passenger Car (2-axle toll rates) were used for all toll locations in the model inputs.

An annual inflation rate of 2.5 percent was assumed. The Value of Time (VOT) from model validation was established to be \$16.67 per hour in the validation year. This is consistent with prior models. The models use a parameter known as the Coefficient of Toll (CTOLL) which is the inverse of the VOT. The product of CTOLL and the toll amount is the time penalty from the toll facilities. **Table 3.5** contains the values of VOT and CTOLL used in the base year and future year models.

Table 3.5
VOT and CTOLL

	2017	2025	2045
VOT	\$16.67	\$20.31	\$33.27
CTOLL	0.060	0.049	0.030

3.2 Traffic Factors

The design year traffic factors for this study are presented in **Table 3.6**. The Design Hour Factor (K) is the proportion of the AADT that occurs during the design hour. The Directional Distribution Factor (D) is the proportion of traffic traveling in the peak direction during the design hour. The K and D factors represent the traffic demand a roadway is typically designed to accommodate. The design year K and D factors presented in **Table 3.6** were developed based on existing conditions data and adjusted to account for peak spreading, based on the FDOT Project Traffic Forecasting Handbook. The design year K factor is 8.2 and 8.5 percent during the AM and PM peak hours, respectively, at the Pine Hills mainline toll plaza. This location was used as the control point in developing and balancing traffic. The D factor in the morning is higher (57.7 percent) than in the evening (53.7 percent) due to a higher percentage of commuter traffic traveling to Orlando downtown.

Existing conditions truck factors were generally maintained for future conditions analysis. The daily truck (T24) factors were obtained from the 2021 Florida Traffic Online web application for Portable Traffic Monitoring Site (PTMS) 75-0584, located on the SR 408 mainline, west of SR 15. For arterials, PTMS 75-7029 was used which is located on John Young Parkway, between Monte Carlo and Church Street, and PTMS 75-0608 which is located on Kirkman Road, north of CR 526. The Design Hour Truck (DHT) factor is the proportion of trucks within the peak hour and is assumed to be half of the daily truck T24 proportion rounded up to the nearest whole number for this study. A PHF of 0.95 was assumed for future conditions.

Table 3.6
Design Year Traffic Factors

Segment	Traffic Factors					
	K	D	K	D	T ₂₄	DHT
	AM		PM		AM and PM	
Freeway Mainline						
SR 408 at Pine Hills Mainline Toll Plaza	8.2%	57.7%	8.5%	53.7%	3.2%	2.0%
SR 408 Ramps						
Kirkman Road						
Eastbound Off-ramp and Westbound On-ramp	8.4%	60.9%	8.9%	54.6%	3.2%	2.0%
Westbound Off-ramp and Eastbound On-ramp	8.7%	53.6%	9.6%	52.8%	3.2%	2.0%
Pine Hills Road						
Westbound Off-ramp and Eastbound On-ramp	9.0%	53.5%	9.0%	53.5%	3.2%	2.0%
Old Winter Garden Road						
Westbound Off-ramp and Eastbound On-ramp	9.0%	63.4%	9.5%	60.5%	3.2%	2.0%
John Young Parkway						
Eastbound Off-ramp and Westbound On-ramp	8.6%	58.5%	9.0%	64.3%	3.2%	2.0%
Westbound Off-ramp and Eastbound On-ramp	8.9%	52.8%	8.8%	69.8%	3.2%	2.0%
Arterials						
Kirkman Road	9.0%	51.9%	9.0%	54.4%	4.1%	3.0%
Pine Hills Road	9.0%	52.6%	9.0%	55.4%	4.1%	3.0%
Old Winter Garden Road	9.0%	54.7%	9.0%	61.2%	6.2%	4.0%
John Young Parkway	9.0%	51.4%	9.0%	54.4%	7.9%	4.0%

3.3 Traffic Forecasts

Traffic projections were generally developed using the updated CFX model for years 2025 and 2045, corresponding to the opening and design analysis years for the study, respectively. The Peak Season Weekday Average Daily Traffic (PSWADT) from the model was converted to AADT by applying a Model Output Calibration Factor (MOCF) of 0.98. The future No Build AADT were compared against the year 2017 validated model to establish linear model growth rates. Using historical growth rates, model growth rates, and the NCHRP 765 approach, 2025 and 2045 AADT and Directional Design Hour Volumes (DDHV) were generated based on the final 2022 existing conditions traffic. Adjustments were made to balance volumes to ensure continuity of flow and for reasonableness. The final SR 408 mainline and ramps AADT and DDHV for years 2025 and 2045 are provided in **Table 3.7**. The bold values represent the mainline volumes, and the non-bold values represent ramp volumes.

Future year turn movement volumes at ramp terminal intersections were developed using the projected ramp DDHV. Turn proportions were generally estimated using existing conditions data and adjusted where applicable for reasonableness. The projected 2025 and 2045 design hour volumes are presented in **Figures 3.4 through 3.7**.

Table 3.7
SR 408 Traffic Forecasts

Location	SR 408	2025					2045				
		AADT	AM - DDHV		PM - DDHV		AADT	AM - DDHV		PM - DDHV	
			EB	WB	EB	WB		EB	WB	EB	WB
		106,100	5,420	3,560	4,370	5,140	150,700	7,230	5,070	5,830	6,830
Kirkman Road		10,900	560	360	440	530	13,600	700	450	550	670
		11,200	520	450	510	570	14,000	660	570	640	710
		106,400	5,380	3,650	4,440	5,180	151,100	7,190	5,190	5,920	6,870
Pine Hills Road		8,800	430	360	360	430	11,000	530	460	460	530
Pine Hills Mainline Plaza		115,200	5,810	4,010	4,800	5,610	162,100	7,720	5,650	6,380	7,400
Old Winter Garden Road/Ortman Drive		7,500	250	430	430	280	9,100	300	520	520	340
		122,700	6,060	4,440	5,230	5,890	171,200	8,020	6,170	6,900	7,740
John Young Parkway		9,000	450	320	290	520	10,900	550	390	350	630
		11,800	500	550	730	320	14,300	600	670	880	380
Church Street		125,500	6,110	4,670	5,670	5,690	174,600	8,070	6,450	7,430	7,490

Values in purple indicate peak hour directional volumes

Figure 3.4
2025 AM Directional Design Hour Volumes

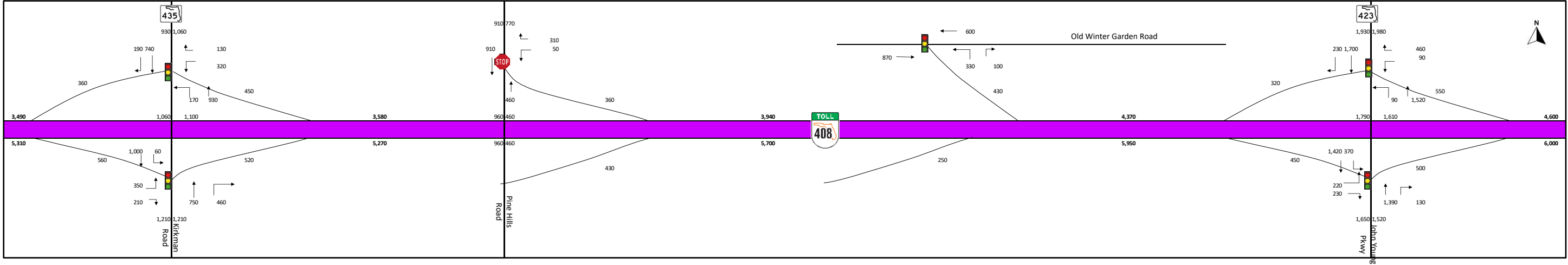


Figure 3.5
2025 PM Directional Design Hour Volumes

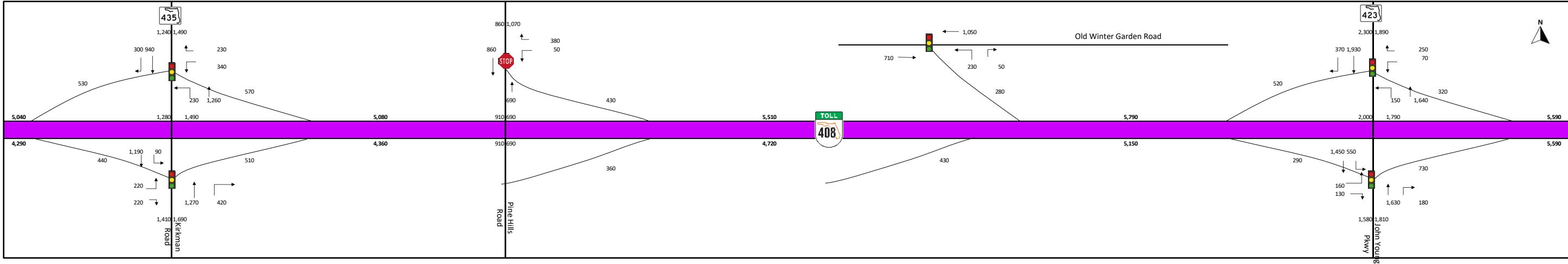


Figure 3.6
2045 AM Directional Design Hour Volumes

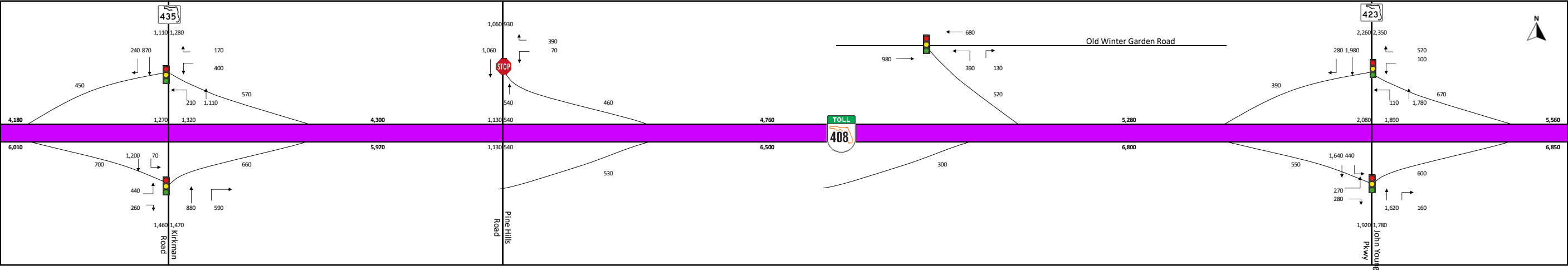
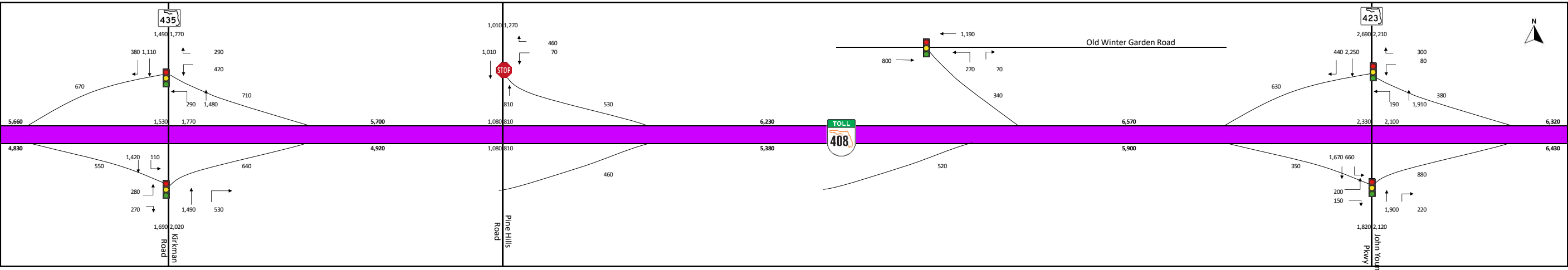


Figure 3.7
2045 PM Directional Design Hour Volumes







3.4 Capacity Analysis for Freeway Mainline and Ramps

Future lane requirements were evaluated to provide an estimated timeline for the onset of capacity deficiencies along the SR 408 mainline and ramp roadways in the future. Freeway mainline LOS targets were based on the FDOT's Quality and LOS Handbook. Capacity analysis for ramp roadways was based on HCM targets. The FDOT and HCM targets were adjusted for local conditions such as speed, truck proportion and PHF.

The lane requirements analysis per direction for the SR 408 mainline and ramps is summarized in **Table 3.8**. The analysis for the mainline segments was based on both LOS D maximum service volume and LOS E (capacity) constraints. The analysis for ramp roadways was based on LOS E (capacity) target only. Based on the LOS D maximum service volume, the SR 408 mainline will require four lanes and an auxiliary lane in each direction from Kirkman Road to Church Street between year 2030 and 2041. The lane requirements do not change based on the LOS E capacity target, but the year of need is delayed to between 2033 and 2045. Further, the proposed four lanes and an auxiliary lane in each direction are expected to serve the projected traffic demand through the 2045 design year. Finally, the analysis does not show a need to widen the existing single lane ramps. Detailed color-coded lane requirements analysis is presented in **Tables 3.9** and **3.10**.

Table 3.8
Lanes Requirements Summary – Number of Lanes per Direction

Location	SR 408	2022 Existing Number of Lanes	Lane Needs (Year) ¹ LOS D/E	Lane Needs (Year) ² LOS E/E
		3 + 1 Aux, EB 3 + 1 Aux, WB	4 + 1 Aux (2037), EB 4 + 1 Aux (2041), WB	4 + 1 Aux (2041), EB 4 + 1 Aux (2045), WB
Kirkman Road		1 1	n/a 1 EB, 2 WB*	n/a n/a
		3 + 1 Aux, EB 3 + 1 Aux, WB	4 + 1 Aux (2037), EB 4 + 1 Aux (2041), WB	4 + 1 Aux (2041), EB 4 + 1 Aux (2045), WB
Pine Hills Road		1	n/a	n/a
Pine Hills Mainline Plaza		3, EB 3, WB	4 + 1 Aux (2032), EB 4 + 1 Aux (2035), WB	4 + 1 Aux (2036), EB 4 + 1 Aux (2039), WB
Old Winter Garden Road/Ortman Drive		1	n/a	n/a
		3, EB 3 + 1 Aux, WB	4 + 1 Aux (2030), EB 4 + 1 Aux (2032), WB	4 + 1 Aux (2033), EB 4 + 1 Aux (2035), WB
John Young Parkway		1 1	2 EB*, 1 WB n/a	n/a n/a
Church Street		3 + 1 Aux, EB 3 + 1 Aux, WB	4 + 1 Aux (2029), EB 4 + 1 Aux (2034), EB	4 + 1 Aux (2032), EB 4 + 1 Aux (2038), EB

¹Mainline Maximum Service Volume (LOS D)/Ramp Capacity (LOS E)

²Mainline Capacity (LOS E)/Ramp Capacity (LOS E)

n/a - no additional lane needs

*2-lane exit proposed to minimize lane change maneuvers



Table 3.9
Future Mainline (LOS D) and Ramp Capacity (LOS E) Lane Requirements

Mainline Maximum Service Volume (LOS D) and Ramp Roadway Capacity (LOS E) - Urbanized Area DDHV - Worst Case AM or PM Design Hour																								
Location	SR 408			Opening	Interpolated																		Design	
				2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Kirkman Road			EB, +1 Aux	5,420	5,510	5,600	5,690	5,780	5,880	5,970	6,060	6,150	6,240	6,330	6,420	6,510	6,600	6,690	6,780	6,870	6,960	7,050	7,140	7,230
			WB, +1 Aux	5,140	5,230	5,310	5,400	5,480	5,570	5,650	5,740	5,820	5,910	5,990	6,070	6,160	6,240	6,330	6,410	6,490	6,580	6,660	6,750	6,830
				560	570	570	580	590	600	600	610	620	620	630	640	640	650	660	670	670	680	690	690	700
				570	580	580	590	600	610	610	620	630	630	640	650	650	660	670	680	680	690	700	700	710
Pine Hills Road			EB, +1 Aux	5,380	5,470	5,560	5,650	5,740	5,840	5,930	6,020	6,110	6,200	6,290	6,380	6,470	6,560	6,650	6,740	6,830	6,920	7,010	7,100	7,190
			WB, +1 Aux	5,180	5,270	5,350	5,440	5,520	5,610	5,690	5,780	5,860	5,950	6,030	6,110	6,200	6,280	6,370	6,450	6,530	6,620	6,700	6,790	6,870
Pine Hills Mainline Plaza				430	440	440	450	450	460	460	470	470	480	480	490	490	500	500	510	510	520	520	530	530
Old Winter Garden Road/Ortman Drive			EB, +1 Aux	5,810	5,910	6,000	6,100	6,190	6,290	6,390	6,480	6,580	6,670	6,770	6,870	6,960	7,060	7,150	7,250	7,340	7,440	7,530	7,630	7,720
			WB, +1 Aux	5,610	5,700	5,790	5,880	5,970	6,060	6,150	6,240	6,330	6,420	6,510	6,600	6,690	6,780	6,870	6,960	7,040	7,130	7,220	7,310	7,400
John Young Parkway				430	440	440	450	450	460	460	470	470	480	480	480	490	490	500	500	500	510	510	520	520
			EB, +1 Aux	6,060	6,160	6,260	6,360	6,460	6,560	6,650	6,750	6,850	6,950	7,050	7,150	7,240	7,340	7,440	7,540	7,630	7,730	7,830	7,920	8,020
			WB, +1 Aux	5,890	5,980	6,080	6,170	6,260	6,360	6,450	6,540	6,630	6,730	6,820	6,910	7,000	7,100	7,190	7,280	7,370	7,460	7,560	7,650	7,740
Church Street				520	530	530	540	540	550	560	560	570	570	580	590	590	600	600	610	610	620	620	630	630
				730	740	750	750	760	770	780	790	790	800	810	820	820	830	840	850	850	860	870	870	880
Church Street			EB, +1 Aux	6,110	6,210	6,310	6,410	6,510	6,610	6,700	6,800	6,900	7,000	7,100	7,200	7,290	7,390	7,490	7,590	7,680	7,780	7,880	7,970	8,070
			WB, +1 Aux	5,690	5,780	5,870	5,960	6,050	6,140	6,230	6,320	6,410	6,500	6,590	6,680	6,770	6,860	6,950	7,040	7,130	7,220	7,310	7,400	7,490
Freeway Inputs				Freeway LOS Targets				Ramp Capacity																
Truck % (t _r)		2.0%		Lanes	LOS D	Lanes*	LOS D	Lanes	LOS E															
Free Flow Speed (mph)		65		2	3,640	2+1	4,640	1	1,850															
Peak Hour Factor (PHF)		0.95		3	5,460	3+1	6,460	2	3,700															
				4	7,280	4+1	8,280	3	5,550															
				5	9,100	5+1	10,100	Speed - 40 to 50 MPH																
				6	10,920	6+1	11,920																	
				*Plus Auxiliary Lane																				



Table 3.10
Future Mainline (LOS E) and Ramp Capacity (LOS E) Lane Requirements

Mainline Maximum Service Volume (LOS E) and Ramp Roadway Capacity (LOS E) - Urbanized Area DDHV - Worst Case AM or PM Design Hour																								
Location	SR 408			Opening	Interpolated																	Design		
				2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Kirkman Road			EB, +1 Aux	5,420	5,510	5,600	5,690	5,780	5,880	5,970	6,060	6,150	6,240	6,330	6,420	6,510	6,600	6,690	6,780	6,870	6,960	7,050	7,140	7,230
			WB, +1 Aux	5,140	5,230	5,310	5,400	5,480	5,570	5,650	5,740	5,820	5,910	5,990	6,070	6,160	6,240	6,330	6,410	6,490	6,580	6,660	6,750	6,830
				560	570	570	580	590	600	600	610	620	620	630	640	640	650	660	670	670	680	690	690	700
				570	580	580	590	600	610	610	620	630	630	640	650	650	660	670	680	680	690	700	700	710
Pine Hills Road			EB, +1 Aux	5,380	5,470	5,560	5,650	5,740	5,840	5,930	6,020	6,110	6,200	6,290	6,380	6,470	6,560	6,650	6,740	6,830	6,920	7,010	7,100	7,190
			WB, +1 Aux	5,180	5,270	5,350	5,440	5,520	5,610	5,690	5,780	5,860	5,950	6,030	6,110	6,200	6,280	6,370	6,450	6,530	6,620	6,700	6,790	6,870
Pine Hills Mainline Plaza				430	440	440	450	450	460	460	470	470	480	480	490	490	500	500	510	510	520	520	530	530
Old Winter Garden Road/Ortman Drive			EB, +1 Aux	5,810	5,910	6,000	6,100	6,190	6,290	6,390	6,480	6,580	6,670	6,770	6,870	6,960	7,060	7,150	7,250	7,340	7,440	7,530	7,630	7,720
			WB, +1 Aux	5,610	5,700	5,790	5,880	5,970	6,060	6,150	6,240	6,330	6,420	6,510	6,600	6,690	6,780	6,870	6,960	7,040	7,130	7,220	7,310	7,400
John Young Parkway				430	440	440	450	450	460	460	470	470	480	480	480	490	490	500	500	500	510	510	520	520
			EB, +1 Aux	6,060	6,160	6,260	6,360	6,460	6,560	6,650	6,750	6,850	6,950	7,050	7,150	7,240	7,340	7,440	7,540	7,630	7,730	7,830	7,920	8,020
			WB, +1 Aux	5,890	5,980	6,080	6,170	6,260	6,360	6,450	6,540	6,630	6,730	6,820	6,910	7,000	7,100	7,190	7,280	7,370	7,460	7,560	7,650	7,740
Church Street				520	530	530	540	540	550	560	560	570	570	580	590	590	600	600	610	610	620	620	630	630
				730	740	750	750	760	770	780	790	790	800	810	820	820	830	840	850	850	860	870	870	880
Church Street			EB, +1 Aux	6,110	6,210	6,310	6,410	6,510	6,610	6,700	6,800	6,900	7,000	7,100	7,200	7,290	7,390	7,490	7,590	7,680	7,780	7,880	7,970	8,070
			WB, +1 Aux	5,690	5,780	5,870	5,960	6,050	6,140	6,230	6,320	6,410	6,500	6,590	6,680	6,770	6,860	6,950	7,040	7,130	7,220	7,310	7,400	7,490

Freeway Inputs	
Truck % (t _r)	2.0%
Free Flow Speed (mph)	65
Peak Hour Factor (PHF)	0.95

Freeway LOS Targets			
Lanes	LOS D	Lanes*	LOS D
2	3,860	2+1	4,860
3	5,790	3+1	6,790
4	7,720	4+1	8,720
5	9,650	5+1	10,650
6	11,580	6+1	12,580

Ramp Capacity	
Lanes	LOS E
1	1,850
2	3,700
3	5,550

Speed - 40 to 50 MPH

*Plus Auxiliary Lane

3.5 Future Conditions Traffic Operations

This section provides a summary of traffic performance results for future conditions. Detailed output reports and analysis files are provided in **Appendix C**.

Future conditions operations on SR 408 were evaluated using the HCS Version 7.9. The analysis results are shown in **Tables 3.11** through **3.14**. In the No Build conditions, most of the segments are expected to operate at an acceptable LOS D or better in 2025 AM and PM peak hours (**Table 3.11**). The exceptions are the eastbound basic segments between Pine Hills Road and John Young Parkway on-ramp that are reported with an unacceptable LOS E in 2025 AM peak hours. In 2045 No Build, most of the SR 408 segments are expected to operate at unacceptable LOS E or F (**Table 3.13**).

With the widening of the freeway in the Build conditions, all the SR 408 segments are expected to operate at an acceptable LOS C or better in the year 2025 in both AM and PM peak hour conditions (**Table 3.12**). In the 2045 design year (**Table 3.14**), most of the segments would operate at an acceptable LOS D or better except for the eastbound segment between the John Young Parkway ramps that is reported with an unacceptable LOS E in 2045 AM. However, the density of 37 pcpmpl is just above the 35 pcpmpl threshold for LOS D. It's important to note that the proposed widening of SR 408 to four lanes and an auxiliary lane in each direction will likely be the ultimate configuration of SR 408 from Kirkman Road to Church Street. This section is expected to be capacity "constrained" in the future as no additional widening is anticipated due to right of way limitations.

Table 3.11
2025 No Build Design Hour Freeway Mainline Segment Operations

Segment	Segment Type	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
SR 408 Eastbound						
Kirkman Road off-ramp to on-ramp	Basic	3	4,860	3,930	D/29	C/23
Kirkman Road on-ramp to Pine Hills Road on-ramp	Merge	3+1Aux	5,380	4,440	C/26	C/21
Kirkman Road on-ramp to Pine Hills Road on-ramp	Basic	3+1Aux	5,380	4,440	C/23	C/19
Pine Hills Road on-ramp to Old Winter Garden Road on-ramp	Merge	3	5,810	4,800	D/29	C/23
Pine Hills Road on-ramp to Old Winter Garden Road on-ramp	Basic	3	5,810	4,800	E/39	D/29
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Merge	3	6,060	5,230	D/33	D/29
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Basic	3	6,060	5,230	E/43	D/33
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Diverge	3	6,060	5,230	D/33	D/29
John Young Parkway off-ramp to on-ramp	Basic	3	5,610	4,940	E/37	D/30
Downstream John Young Parkway on-ramp	Merge	3+1Aux	6,110	5,670	D/29	C/28
SR 408 Westbound						
Upstream John Young Parkway off-ramp	Diverge	3+1 Aux	4,670	5,690	B/12	B/15
John Young Parkway off-ramp to on-ramp	Basic	3	4,120	5,370	C/24	D/34
John Young Parkway on-ramp to Old Winter Garden Road off-ramp	Weave	3+1Aux	4,440	5,890	C/20	D/28
Old Winter Garden Road off-ramp to Pine Hills Road off-ramp	Basic	3	4,010	5,610	C/24	D/33
Old Winter Garden Road off-ramp to Pine Hills Road off-ramp	Diverge	3	4,010	5,610	B/17	C/24
Pine Hills Road off-ramp to Kirkman Road off-ramp	Basic	3+1 Aux	3,650	5,180	B/16	C/23
Pine Hills Road off-ramp to Kirkman Road off-ramp	Diverge	3+1 Aux	3,650	5,180	A/8	B/15
Kirkman Road off-ramp to on-ramp	Basic	3	3,200	4,610	C/19	D/27

Table 3.12
2025 Build Design Hour Freeway Mainline Segment Operations

Segment	Segment Type	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
SR 408 Eastbound						
Kirkman Road off-ramp to on-ramp	Basic	4	4,860	3,930	C/21	B/17
Kirkman Road on-ramp to Pine Hills Road on-ramp	Merge	4+1 Aux	5,380	4,440	B/17	B/13
Kirkman Road on-ramp to Pine Hills Road on-ramp	Basic	4+1 Aux	5,380	4,440	C/19	B/15
Pine Hills Road on-ramp to Old Winter Garden Road on-ramp	Merge	5	5,810	4,800	B/15	B/12
Pine Hills Road on-ramp to Old Winter Garden Road on-ramp	Basic	5	5,810	4,800	C/20	B/17
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Merge	5	6,060	5,230	B/19	B/18
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Basic	5	6,060	5,230	C/21	C/18
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Diverge	5	6,060	5,230	A/10	A/7
John Young Parkway off-ramp to on-ramp	Basic	4	5,610	4,940	C/24	C/21
Downstream John Young Parkway on-ramp	Merge	4+1 Aux	6,110	5,670	B/19	B/18
SR 408 Westbound						
Upstream John Young Parkway off-ramp	Diverge	4+1 Aux	4,670	5,690	B/11	B/12
John Young Parkway off-ramp to on-ramp	Basic	4	4,120	5,370	B/18	C/23
John Young Parkway on-ramp to Old Winter Garden Road off-ramp	Merge	5	4,440	5,890	B/13	B/18
John Young Parkway on-ramp to Old Winter Garden Road off-ramp	Basic	5	4,440	5,890	B/15	C/20
John Young Parkway on-ramp to Old Winter Garden Road off-ramp	Diverge	5	4,440	5,890	B/20	C/23
Old Winter Garden Road off-ramp to Pine Hills Road off-ramp	Basic	5	4,010	5,610	B/14	C/20
Old Winter Garden Road off-ramp to Pine Hills Road off-ramp	Diverge	5	4,010	5,610	A/8	B/13
Pine Hills Road off-ramp to Kirkman Road off-ramp	Basic	4+1 Aux	3,650	5,180	B/13	B/18
Pine Hills Road off-ramp to Kirkman Road off-ramp	Diverge	4+1 Aux	3,650	5,180	A/4	A/7
Kirkman Road off-ramp to on-ramp	Basic	4	3,200	4,610	B/14	C/20

Table 3.13
2045 No Build Design Hour Freeway Mainline Segment Operations

Segment	Segment Type	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
SR 408 Eastbound						
Kirkman Road off-ramp to on-ramp	Basic	3	6,530	5,280	F	D/33
Kirkman Road on-ramp to Pine Hills Road on-ramp	Merge	3+1Aux	7,190	5,920	F	D/29
Kirkman Road on-ramp to Pine Hills Road on-ramp	Basic	3+1Aux	7,190	5,920	D/34	C/26
Pine Hills Road on-ramp to Old Winter Garden Road on-ramp	Merge	3	7,720	6,380	F	F
Pine Hills Road on-ramp to Old Winter Garden Road on-ramp	Basic	3	7,720	6,380	F	F
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Merge	3	8,020	6,900	F	F
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Basic	3	8,020	6,900	F	F
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Diverge	3	8,020	6,900	F	F
John Young Parkway off-ramp to on-ramp	Basic	3	7,470	6,550	F	F
Downstream John Young Parkway on-ramp	Merge	3+1Aux	8,070	7,430	F	F
SR 408 Westbound						
Upstream John Young Parkway off-ramp	Diverge	3+1 Aux	6,450	7,490	C/20	C/23
John Young Parkway off-ramp to on-ramp	Basic	3	5,780	7,110	E/39	F
John Young Parkway on-ramp to Old Winter Garden Road off-ramp	Weave	3+1Aux	6,170	7,740	F	F
Old Winter Garden Road off-ramp to Pine Hills Road off-ramp	Basic	3	5,650	7,400	E/37	F
Old Winter Garden Road off-ramp to Pine Hills Road off-ramp	Diverge	3	5,650	7,400	C/24	F
Pine Hills Road off-ramp to Kirkman Road off-ramp	Basic	3+1 Aux	5,190	6,870	C/23	D/32
Pine Hills Road off-ramp to Kirkman Road off-ramp	Diverge	3+1 Aux	5,190	6,870	B/15	C/22
Kirkman Road off-ramp to on-ramp	Basic	3	4,620	6,160	D/27	E/45

Table 3.14
2045 Build Design Hour Freeway Mainline Segment Operations

Segment	Segment Type	Lanes	Volume (vph)		LOS/Density	
			AM	PM	AM	PM
SR 408 Eastbound						
Kirkman Road off-ramp to on-ramp	Basic	4	6,530	5,280	D/30	C/23
Kirkman Road on-ramp to Pine Hills Road on-ramp	Merge	4+1 Aux	7,190	5,920	C/23	B/19
Kirkman Road on-ramp to Pine Hills Road on-ramp	Basic	4+1 Aux	7,190	5,920	C/25	C/21
Pine Hills Road on-ramp to Old Winter Garden Road on-ramp	Merge	5	7,720	6,380	B/19	B/16
Pine Hills Road on-ramp to Old Winter Garden Road on-ramp	Basic	5	7,720	6,380	D/27	C/22
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Merge	5	8,020	6,900	C/23	C/22
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Basic	5	8,020	6,900	D/29	C/24
Old Winter Garden Road on-ramp to John Young Parkway off-ramp	Diverge	5	8,020	6,900	B/15	B/11
John Young Parkway off-ramp to on-ramp	Basic	4	7,470	6,550	E/37	D/30
Downstream John Young Parkway on-ramp	Merge	4+1 Aux	8,070	7,430	C/26	C/25
SR 408 Westbound						
Upstream John Young Parkway off-ramp	Diverge	4+1 Aux	6,450	7,490	B/16	B/17
John Young Parkway off-ramp to on-ramp	Basic	4	5,780	7,110	C/25	D/34
John Young Parkway on-ramp to Old Winter Garden Road off-ramp	Merge	5	6,170	7,740	B/19	C/25
John Young Parkway on-ramp to Old Winter Garden Road off-ramp	Basic	5	6,170	7,740	C/21	D/28
John Young Parkway on-ramp to Old Winter Garden Road off-ramp	Diverge	5	6,170	7,740	C/25	D/28
Old Winter Garden Road off-ramp to Pine Hills Road off-ramp	Basic	5	5,650	7,400	C/20	C/26
Old Winter Garden Road off-ramp to Pine Hills Road off-ramp	Diverge	5	5,650	7,400	B/14	B/18
Pine Hills Road off-ramp to Kirkman Road off-ramp	Basic	4+1 Aux	5,190	6,870	B/18	C/24
Pine Hills Road off-ramp to Kirkman Road off-ramp	Diverge	4+1 Aux	5,190	6,870	A/18	B/11
Kirkman Road off-ramp to on-ramp	Basic	4	4,620	6,160	C/20	D/27

Capacity on the ramp roadways was assessed by comparing it with the future demand. The ramp V/C analysis results for 2025 and 2045 No Build and Build conditions are summarized in **Tables 3.15** and **3.16**. Results show that the highest V/C is 0.5 in 2045 peak hours, indicating that the ramps have considerable amount of unused capacity during both the AM and PM design hours.

Table 3.15
2025 Design Hour Ramp Capacity Analysis

Interchange	Ramp	Lanes	Volume (vph)		Capacity (vph)	V/C	
			AM	PM		AM	PM
2025 No Build							
Kirkman Road	Eastbound off-ramp	1	560	440	1,850	0.3	0.2
	Westbound on-ramp	1	360	530	1,850	0.2	0.3
	Eastbound on-ramp	1	520	510	1,850	0.3	0.3
	Westbound off-ramp	1	450	570	1,850	0.2	0.3
Pine Hills Road	Eastbound on-ramp	1	430	360	1,850	0.2	0.2
	Westbound off-ramp	1	360	430	1,850	0.2	0.2
Old Winter Garden Road	Eastbound on-ramp	1	250	430	1,850	0.1	0.2
	Westbound off-ramp	1	430	280	1,850	0.2	0.2
John Young Parkway	Eastbound off-ramp	1	450	290	1,850	0.2	0.2
	Westbound on-ramp	1	320	520	1,850	0.2	0.3
	Eastbound on-ramp	1	500	730	1,850	0.3	0.4
	Westbound off-ramp	1	550	320	1,850	0.3	0.2
2025 Build							
Kirkman Road	Eastbound off-ramp	1	560	440	1,850	0.3	0.2
	Westbound on-ramp	1	360	530	1,850	0.2	0.3
	Eastbound on-ramp	1	520	510	1,850	0.3	0.3
	Westbound off-ramp	2	450	570	3,700	0.1	0.2
Pine Hills Road	Eastbound on-ramp	1	430	360	1,850	0.2	0.2
	Westbound off-ramp	1	360	430	1,850	0.2	0.2
Old Winter Garden Road	Eastbound on-ramp	1	250	430	1,850	0.1	0.2
	Westbound off-ramp	1	430	280	1,850	0.2	0.2
John Young Parkway	Eastbound off-ramp	2	450	290	3,700	0.1	0.1
	Westbound on-ramp	1	320	520	1,850	0.2	0.3
	Eastbound on-ramp	1	500	730	1,850	0.3	0.4
	Westbound off-ramp	1	550	320	1,850	0.3	0.2

Table 3.16
2045 Design Hour Ramp Capacity Analysis

Interchange	Ramp	Lanes	Volume (vph)		Capacity (vph)	V/C	
			AM	PM		AM	PM
2045 No Build							
Kirkman Road	Eastbound off-ramp	1	700	550	1,850	0.4	0.3
	Westbound on-ramp	1	450	670	1,850	0.2	0.4
	Eastbound on-ramp	1	660	640	1,850	0.4	0.3
	Westbound off-ramp	1	570	710	1,850	0.3	0.4
Pine Hills Road	Eastbound on-ramp	1	530	460	1,850	0.3	0.2
	Westbound off-ramp	1	460	530	1,850	0.2	0.3
Old Winter Garden Road	Eastbound on-ramp	1	300	520	1,850	0.2	0.3
	Westbound off-ramp	1	520	340	1,850	0.3	0.2
John Young Parkway	Eastbound off-ramp	1	550	350	1,850	0.3	0.2
	Westbound on-ramp	1	390	630	1,850	0.2	0.3
	Eastbound on-ramp	1	600	880	1,850	0.3	0.5
	Westbound off-ramp	1	670	380	1,850	0.4	0.2
2045 Build							
Kirkman Road	Eastbound off-ramp	1	700	550	1,850	0.4	0.3
	Westbound on-ramp	1	450	670	1,850	0.2	0.4
	Eastbound on-ramp	1	660	640	1,850	0.4	0.3
	Westbound off-ramp	2	570	710	3,700	0.2	0.2
Pine Hills Road	Eastbound on-ramp	1	530	460	1,850	0.3	0.2
	Westbound off-ramp	1	460	530	1,850	0.2	0.3
Old Winter Garden Road	Eastbound on-ramp	1	300	520	1,850	0.2	0.3
	Westbound off-ramp	1	520	340	1,850	0.3	0.2
John Young Parkway	Eastbound off-ramp	2	550	350	3,700	0.1	0.1
	Westbound on-ramp	1	390	630	1,850	0.2	0.3
	Eastbound on-ramp	1	600	880	1,850	0.3	0.5
	Westbound off-ramp	1	670	380	1,850	0.4	0.2

Using Synchro software version 11, the intersection's LOS and delay were assessed, while SimTraffic was used to estimate queue lengths. The outcomes of the study for the 2025 and 2045 AM and PM peak hours are outlined in **Tables 3.17** and **3.18**, respectively. The existing lane geometry was maintained in the future intersection analysis for both No Build and Build alternatives along SR 408. Detailed Synchro/SimTraffic output reports are included in **Appendix C**. The study results show that all intersections within the study area are expected to operate at an acceptable LOS D or better during both the AM and PM peak hours in the 2025 opening and 2045 design years, although some movements are expected to operate an unacceptable LOS F, which is typical. The delays for some movements were found to be reduced in future years compared to existing conditions due to signal timing optimization, mainly in 2025. The 2045 future queue lengths can be accommodated in the available storage lengths for the most part, except for four movements where the estimated maximum queue is just slightly longer than storage. This is not expected to be a concern and additional analysis can be conducted in the future to reassess the intersection operations and turn bay needs.

Table 3.17
2025 Future AM and PM Design Hour Intersection LOS/Delay (sec)

Intersection	Approach	Movement	LOS	Delay (Seconds)	Maximum Queue Length (Feet)*	Available Storage Length (Feet)
			AM (PM)	AM (PM)	AM (PM)	
Kirkman Road and SR 408 Eastbound Ramps	Eastbound	Left	F (E)	80.7 (75.1)	301 (216)	300
		Through	-	-	-	-
		Right	B (B)	11.9 (12.3)	142 (177)	300
	Northbound	Left	-	-	-	-
		Through	B (B)	11.2 (13.5)	221 (297)	-
		Right	A (A)	2.0 (2.0)	107 (211)	250
	Southbound	Left	F (F)	107.9 (117.0)	153 (192)	530
		Through	B (B)	11.5 (11.9)	252 (300)	-
		Right	-	-	-	-
	Overall Intersection		C (B)	20.5 (18.2)		
Kirkman Road and SR 408 Westbound Ramps	Westbound	Left	E (F)	76.8 (85.1)	299 (328)	400
		Through	-	-	-	-
		Right	B (B)	12.1 (12.3)	101 (195)	400
	Northbound	Left	E (E)	67.6 (71.3)	274 (373)	530
		Through	B (A)	11.4 (7.5)	264 (193)	-
		Right	-	-	-	-
	Southbound	Left	-	-	-	-
		Through	C (C)	21.8 (26.3)	309 (396)	-
		Right	A (A)	3.2 (3.3)	286 (264)	300
	Overall Intersection		C (C)	26.2 (25.2)	-	-
Pine Hills Road and SR 408 Westbound Ramps	Westbound	Left	C (D)	22.8 (32.1)	90 (124)	350
		Through	-	-	-	-
		Right	B (C)	13.2 (19.7)	116 (174)	-
	Northbound	Left	-	-	-	-
		Through	A (A)	0.0 (0.0)	0 (4)	-
		Right	-	-	-	-
	Southbound	Left	-	-	-	-
		Through	A (A)	0.0 (0.0)	0 (2)	-
		Right	-	-	-	-
	Overall Intersection		A (A)	3.0 (4.6)		
Old Winter Garden Road and SR 408 Westbound Ramps	Eastbound	Left	-	-	-	-
		Through	B (A)	11.8 (7.1)	272 (213)	-
		Right	-	-	-	-
	Westbound	Left	-	-	-	-
		Through	B (A)	10.5 (8.3)	205 (254)	-
		Right	-	-	-	-
	Northbound	Left	E (E)	59.6 (76.6)	438 (362)	1,000
		Through	-	-	-	-
		Right	B (B)	10.4 (12.6)	95 (73)	-
	Overall Intersection		B (B)	19.6 (15.7)	-	-
John Young Parkway and SR 408 Eastbound Ramps	Eastbound	Left	E (F)	68.5 (91.9)	246 (213)	450
		Through	-	-	-	-
		Right	E (D)	73.1 (41.6)	203 (127)	-
	Northbound	Left	-	-	-	-
		Through	C (D)	31.6 (40.3)	514 (682)	-
		Right	A (B)	9.9 (13.3)	239 (300)	250
	Southbound	Left	C (D)	32.2 (44.7)	353 (362)	780
		Through	A (A)	2.0 (0.6)	262 (130)	-
		Right	-	-	-	-
	Overall Intersection		C (C)	24.4 (27.7)		
John Young Parkway and SR 408 Westbound Ramps	Westbound	Left	E (F)	60.0 (84.5)	196 (188)	500
		Through	-	-	-	-
		Right	E (E)	68.6 (66.6)	209 (158)	500
	Northbound	Left	B (B)	15.9 (19.0)	161 (255)	430
		Through	A (A)	7.0 (2.8)	176 (201)	-
		Right	-	-	-	-
	Southbound	Left	-	-	-	-
		Through	C (C)	22.9 (21.1)	260 (776)	-
		Right	A (A)	4.6 (4.6)	228 (232)	250
	Overall Intersection		C (B)	21.8 (16.4)	-	-

*SimTraffic maximum queue length

Table 3.18
2045 Future AM and PM Design Hour Intersection LOS/Delay (sec)

Intersection	Approach	Movement	LOS	Delay (Seconds)	Maximum Queue Length (Feet)*	Available Storage Length (Feet)
			AM (PM)	AM (PM)	AM (PM)	
Kirkman Road and SR 408 Eastbound Ramps	Eastbound	Left	E (E)	77.4 (71.9)	368 (258)	300
		Through	-	-	-	-
		Right	B (B)	10.1 (10.7)	298 (229)	300
	Northbound	Left	-	-	-	-
		Through	B (B)	14.2 (17.6)	242 (339)	-
		Right	A (A)	2.6 (2.6)	150 (252)	250
	Southbound	Left	F (F)	105.2 (111.7)	168 (215)	530
		Through	B (B)	15.2 (15.8)	297 (354)	-
		Right	-	-	-	-
	Overall Intersection		C (C)	22.2 (20.8)		
Kirkman Road and SR 408 Westbound Ramps	Westbound	Left	E (F)	73.0 (82.1)	357 (366)	400
		Through	-	-	-	-
		Right	B (C)	10.1 (23.0)	129 (247)	400
	Northbound	Left	E (E)	65.9 (72.7)	333 (449)	530
		Through	B (A)	15.0 (10.1)	317 (253)	-
		Right	-	-	-	-
	Southbound	Left	-	-	-	-
		Through	C (C)	27.6 (33.8)	406 (476)	-
		Right	A (A)	3.7 (4.0)	254 (334)	300
	Overall Intersection		C (C)	28.8 (29.3)	-	-
Pine Hills Road and SR 408 Westbound Ramps	Westbound	Left	D (F)	33.2 (59.5)	172 (206)	350
		Through	-	-	-	-
		Right	C (E)	16.6 (35.1)	141 (225)	-
	Northbound	Left	-	-	-	-
		Through	A (A)	0.0 (0.0)	23 (0)	-
		Right	-	-	-	-
	Southbound	Left	-	-	-	-
		Through	A (A)	0.0 (0.0)	15 (14)	-
		Right	-	-	-	-
	Overall Intersection		A (A)	4.3 (8.6)		
Old Winter Garden Road and SR 408 Westbound Ramps	Eastbound	Left	-	-	-	-
		Through	B (A)	15.3 (8.8)	325 (243)	-
		Right	-	-	-	-
	Westbound	Left	-	-	-	-
		Through	B (B)	13.4 (10.6)	226 (333)	-
		Right	-	-	-	-
	Northbound	Left	E (E)	56.4 (74.7)	520 (428)	1,000
		Through	-	-	-	-
		Right	B (B)	19.4 (10.2)	123 (80)	-
	Overall Intersection		C (B)	22.3 (17.4)	-	-
John Young Parkway and SR 408 Eastbound Ramps	Eastbound	Left	E (F)	66.1 (103.4)	280 (285)	450
		Through	-	-	-	-
		Right	F (F)	82.2 (82.8)	298 (237)	-
	Northbound	Left	-	-	-	-
		Through	D (E)	44.0 (55.2)	633 (975)	-
		Right	B (B)	13.7 (16.5)	300 (300)	250
	Southbound	Left	F (E)	82.4 (62.3)	362 (361)	780
		Through	A (A)	1.6 (0.6)	149 (70)	-
		Right	-	-	-	-
	Overall Intersection		C (D)	34.8 (38.3)		
John Young Parkway and SR 408 Westbound Ramps	Westbound	Left	D (E)	53.0 (78.0)	225 (181)	500
		Through	-	-	-	-
		Right	E (E)	66.6 (73.7)	311 (176)	500
	Northbound	Left	C (B)	22.7 (18.4)	200 (238)	430
		Through	A (A)	8.2 (3.4)	233 (242)	-
		Right	-	-	-	-
	Southbound	Left	-	-	-	-
		Through	C (C)	29.7 (26.7)	390 (2,130)	-
		Right	A (A)	7.7 (7.9)	58 (348)	250
	Overall Intersection		C (B)	25.2 (19.7)	-	-

*SimTraffic maximum queue length

4.0 Conclusion

This Project Traffic Analysis Memorandum is prepared to support the SR 408 PD&E study from Kirkman Road to Church Street (#408-174), that is evaluating improvements to address existing and future capacity needs. Currently, field observations show that the SR 408 three-lane eastbound segment from Pine Hills Road on-ramp to John Young Parkway off-ramp is a congestion hotspot during the morning commute on weekdays. Merging traffic from the Pine Hills Road/toll plaza cash lanes and Old Winter Garden Road on-ramps exacerbate congestion in this area. In addition, traffic demand in other segments within the study limits is expected to exceed capacity in the future.

The analysis showed that the SR 408 mainline will require four lanes and an auxiliary lane in each direction from Kirkman Road to Church Street between year 2030 and 2041. These capacity improvements are expected to serve the projected traffic demand through the 2045 design year. The analysis did not show a need to widen the existing single lane ramps or add intersection capacity.

Appendices



Appendix A

2022 Existing Analysis

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, In	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4479	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1604
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.73
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	26.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing AM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4479	473
Peak Hour Factor (PHF)	0.95	0.95
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	4811	508
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.81	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 (MS)	0.320
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1828
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	55.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.620	Outer Lanes Freeway Speed (SO), mi/h	57.1
Flow in Lanes 1 and 2 (v12), pc/h	2983	Ramp Junction Speed (S), mi/h	56.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	3491	Average Density (D), pc/mi/ln	31.7
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	23.1

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4952	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1330
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.60
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing AM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1300
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4952	370
Peak Hour Factor (PHF)	0.95	0.95
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	5319	397
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.87	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)	0.361
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2053
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)	0.614	Outer Lanes Freeway Speed (SO), mi/h	56.3
Flow in Lanes 1 and 2 (v12), pc/h	3266	Ramp Junction Speed (S), mi/h	55.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	3663	Average Density (D), pc/mi/ln	34.5
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	25.8

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5322	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1905
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.86
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	56.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	33.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5322	222
Peak Hour Factor (PHF)	0.95	0.95
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	5716	238
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.91	0.12

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)	0.417
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2321
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)	0.594	Outer Lanes Freeway Speed (SO), mi/h	55.2
Flow in Lanes 1 and 2 (v12), pc/h	3395	Ramp Junction Speed (S), mi/h	54.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	3633	Average Density (D), pc/mi/ln	36.6
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	30.0

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5544	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1985
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.90
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	55.1
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	36.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5544	386
Peak Hour Factor (PHF)	0.95	0.95
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	5955	415
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.91	0.21

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)	0.363
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2260
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.592	Outer Lanes Freeway Speed (SO), mi/h	63.0
Flow in Lanes 1 and 2 (v12), pc/h	3695	Ramp Junction Speed (S), mi/h	57.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	34.5
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	30.6

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5157	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1846
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.84
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	57.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	31.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing AM Peak
Project Description	Downstream John Young Parkway on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5157	431
Peak Hour Factor (PHF)	0.95	0.95
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	5539	463
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.91	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)	0.384
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2105
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	54.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.620	Outer Lanes Freeway Speed (SO), mi/h	56.1
Flow in Lanes 1 and 2 (v12), pc/h	3434	Ramp Junction Speed (S), mi/h	54.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	3897	Average Density (D), pc/mi/ln	36.4
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	26.3

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing AM Peak
Project Description	Upstream John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	3516	478
Peak Hour Factor (PHF)	0.95	0.95
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	3777	513
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.43	0.26

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)	0.371
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	921
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	67.9
Flow in Lanes 1 and 2 (v12), pc/h	1936	Ramp Junction Speed (S), mi/h	60.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	15.7
Level of Service (LOS)	A	Density in Ramp Influence Area (DR), pc/mi/ln	7.4

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3038	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1088
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.49
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Weaving Report

Project Information

Analyst	CDM Smith	Date	3/29/2023
Agency	CDM Smith	Analysis Year	2023
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (Ls), ft	1900	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.10	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	2627	304	0	411
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	2.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.980	0.980	0.980
Flow Rate (vi), pc/h	2822	327	0	441
Weaving Flow Rate (vw), pc/h	768	Freeway Max Capacity (ciFL), pc/h/ln		2319
Non-Weaving Flow Rate (vNW), pc/h	2822	Density-Based Capacity (ciWL), pc/h/ln		2106
Total Flow Rate (v), pc/h	3590	Demand Flow-Based Capacity (ciW), pc/h		11215
Volume Ratio (VR)	0.214	Weaving Segment Capacity (cw), veh/h		8256
Minimum Lane Change Rate (LCMIN), lc/h	768	Adjusted Weaving Area Capacity, pc/h		8029
Maximum Weaving Length (LMAX), ft	4680	Volume-to-Capacity Ratio (v/c)		0.45

Speed and Density

Non-Weaving Vehicle Index (INW)	590	Average Weaving Speed (SW), mi/h	52.8
Non-Weaving Lane Change Rate (LCNW), lc/h	841	Average Non-Weaving Speed (SNW), mi/h	52.1
Weaving Lane Change Rate (LCW), lc/h	1220	Average Speed (S), mi/h	52.2
Weaving Lane Change Rate (LCAII), lc/h	2061	Density (D), pc/mi/ln	17.2
Weaving Intensity Factor (W)	0.241	Level of Service (LOS)	B

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2931	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1049
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.47
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing AM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1380
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2931	277
Peak Hour Factor (PHF)	0.95	0.95
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	3148	298
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.48	0.15

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)	0.352
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/h/ln	946
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.668	Outer Lanes Freeway Speed (SO), mi/h	67.9
Flow in Lanes 1 and 2 (v12), pc/h	2202	Ramp Junction Speed (S), mi/h	58.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	18.0
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	10.8

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2654	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	713
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.32
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	11.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing AM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2654	413
Peak Hour Factor (PHF)	0.95	0.95
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	2851	444
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.33	0.22

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)	0.365
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	679
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	67.9
Flow in Lanes 1 and 2 (v12), pc/h	1493	Ramp Junction Speed (S), mi/h	60.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	11.8
Level of Service (LOS)	A	Density in Ramp Influence Area (DR), pc/mi/ln	3.6

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	2241	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	802
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.36
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	13.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3612	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1293
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.59
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing PM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	3612	500
Peak Hour Factor (PHF)	0.95	0.95
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	3880	537
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.67	0.27

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)	0.266
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1474
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	56.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.620	Outer Lanes Freeway Speed (SO), mi/h	58.4
Flow in Lanes 1 and 2 (v12), pc/h	2406	Ramp Junction Speed (S), mi/h	57.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	2943	Average Density (D), pc/mi/ln	25.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	18.9

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4112	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1104
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.50
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing PM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1300
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4112	325
Peak Hour Factor (PHF)	0.95	0.95
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	4417	349
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.72	0.17

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)	0.293
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1705
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)	0.614	Outer Lanes Freeway Speed (SO), mi/h	57.6
Flow in Lanes 1 and 2 (v12), pc/h	2712	Ramp Junction Speed (S), mi/h	56.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	3061	Average Density (D), pc/mi/ln	28.1
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	21.1

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4438	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1589
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.1
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	26.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4438	362
Peak Hour Factor (PHF)	0.95	0.95
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	4767	389
Capacity (c), pc/h	6576	2001
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)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.367
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1935
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	54.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.594	Outer Lanes Freeway Speed (SO), mi/h	56.7
Flow in Lanes 1 and 2 (v12), pc/h	2832	Ramp Junction Speed (S), mi/h	55.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	3221	Average Density (D), pc/mi/ln	31.0
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	26.7

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4800	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1719
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.78
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	59.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	28.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4800	277
Peak Hour Factor (PHF)	0.95	0.95
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	5156	298
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.78	0.15

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)	0.352
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1861
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.617	Outer Lanes Freeway Speed (SO), mi/h	64.5
Flow in Lanes 1 and 2 (v12), pc/h	3295	Ramp Junction Speed (S), mi/h	58.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	29.6
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	27.2

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4523	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1619
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.73
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	60.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	26.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing PM Peak
Project Description	Downstream John Young Parkway on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4523	662
Peak Hour Factor (PHF)	0.95	0.95
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	4858	711
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.85	0.36

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	1846
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	54.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.620	Outer Lanes Freeway Speed (SO), mi/h	57.1
Flow in Lanes 1 and 2 (v12), pc/h	3012	Ramp Junction Speed (S), mi/h	55.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	3723	Average Density (D), pc/mi/ln	33.4
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	24.9

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing PM Peak
Project Description	Upstream John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5183	287
Peak Hour Factor (PHF)	0.95	0.95
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	5567	308
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.63	0.15

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)	0.353
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1483
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	66.0
Flow in Lanes 1 and 2 (v12), pc/h	2601	Ramp Junction Speed (S), mi/h	60.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	23.1
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	13.1

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4896	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1753
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.79
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	59.3
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	29.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Weaving Report

Project Information

Analyst	CDM Smith	Date	3/29/2023
Agency	CDM Smith	Analysis Year	2023
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (Ls), ft	1900	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.10	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	4640	501	0	257
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	2.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.980	0.980	0.980
Flow Rate (vi), pc/h	4984	538	0	276
Weaving Flow Rate (vw), pc/h	814	Freeway Max Capacity (ciFL), pc/h/ln		2319
Non-Weaving Flow Rate (vNW), pc/h	4984	Density-Based Capacity (ciWL), pc/h/ln		2164
Total Flow Rate (v), pc/h	5798	Demand Flow-Based Capacity (ciW), pc/h		17143
Volume Ratio (VR)	0.140	Weaving Segment Capacity (cw), veh/h		8483
Minimum Lane Change Rate (LCMIN), lc/h	814	Adjusted Weaving Area Capacity, pc/h		8249
Maximum Weaving Length (LMAX), ft	3932	Volume-to-Capacity Ratio (v/c)		0.70

Speed and Density

Non-Weaving Vehicle Index (INW)	1042	Average Weaving Speed (SW), mi/h	51.5
Non-Weaving Lane Change Rate (LCNW), lc/h	1286	Average Non-Weaving Speed (SNW), mi/h	49.1
Weaving Lane Change Rate (LCW), lc/h	1266	Average Speed (S), mi/h	49.4
Weaving Lane Change Rate (LCAII), lc/h	2552	Density (D), pc/mi/ln	29.3
Weaving Intensity Factor (W)	0.285	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5141	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1841
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.83
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	58.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	31.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing PM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1380
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5141	336
Peak Hour Factor (PHF)	0.95	0.95
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	5522	361
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.84	0.18

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)	0.358
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2039
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.605	Outer Lanes Freeway Speed (SO), mi/h	63.9
Flow in Lanes 1 and 2 (v12), pc/h	3483	Ramp Junction Speed (S), mi/h	57.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	31.8
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	21.8

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4805	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1290
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.58
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange	Time Analyzed	Existing PM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), In	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4805	533
Peak Hour Factor (PHF)	0.95	0.95
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	5161	573
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.59	0.29

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)	0.377
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/h/ln	1294
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	66.8
Flow in Lanes 1 and 2 (v12), pc/h	2573	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	21.5
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	12.9

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity








Demand Volume veh/h	4272	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1530
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.69
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	24.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

Lanes, Volumes, Timings
1: Kirkman Road & SR 408 WB ramps

2022 AM Existing

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	297	0	116	130	905	0	0	696	143
Future Volume (vph)	0	0	0	297	0	116	130	905	0	0	696	143
Satd. Flow (prot)	0	0	0	3433	0	1583	1770	5085	0	0	5085	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	1770	5085	0	0	5085	1583
Satd. Flow (RTOR)						125						152
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	0	0	316	0	123	138	963	0	0	740	152
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	316	0	123	138	963	0	0	740	152
Turn Type				Prot		Perm	Prot	NA			NA	Perm
Protected Phases				4			1	6			2	
Permitted Phases						4						2
Total Split (s)				43.0		43.0	38.0	89.0			89.0	89.0
Total Lost Time (s)				7.0		7.0	7.9	6.9			7.0	7.0
Act Effct Green (s)				24.3		24.3	30.1	113.4			93.7	93.7
Actuated g/C Ratio				0.14		0.14	0.18	0.67			0.55	0.55
v/c Ratio				0.64		0.37	0.44	0.28			0.26	0.16
Control Delay				74.6		11.8	55.7	17.3			20.8	3.1
Queue Delay				0.0		0.0	0.0	0.2			0.0	0.0
Total Delay				74.6		11.8	55.7	17.5			20.8	3.1
LOS				E		B	E	B			C	A
Approach Delay					57.0			22.3			17.8	
Approach LOS					E			C			B	
Queue Length 50th (ft)				174		0	139	161			154	0
Queue Length 95th (ft)				220		59	215	186			198	38
Internal Link Dist (ft)		526			1048			446			818	
Turn Bay Length (ft)				400		400						300
Base Capacity (vph)				726		433	313	3393			2802	940
Starvation Cap Reductn				0		0	0	1386			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.44		0.28	0.44	0.48			0.26	0.16
Intersection Summary												
Cycle Length: 170												
Actuated Cycle Length: 170												
Offset: 91 (54%), Referenced to phase 2:SBT and 6:NBT, Start of Green												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.77												
Intersection Signal Delay: 26.9						Intersection LOS: C						

Lane Group	Ø5	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	8
Permitted Phases		
Total Split (s)	38.0	43.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings 1: Kirkman Road & SR 408 WB ramps

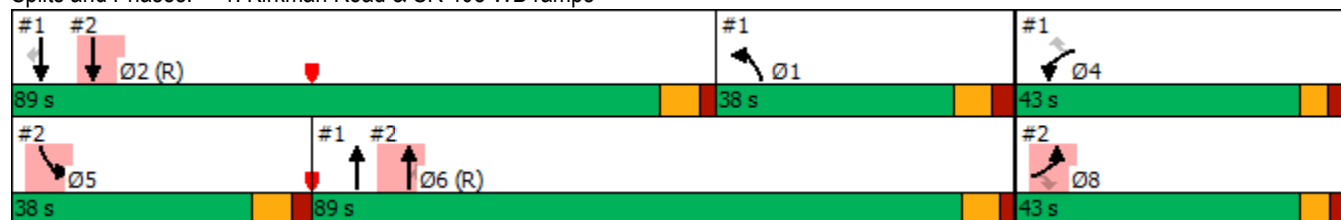
2022 AM Existing

Intersection Capacity Utilization 57.2%

ICU Level of Service B



















Analysis Period (min) 15

Splits and Phases: 1: Kirkman Road & SR 408 WB ramps



Lanes, Volumes, Timings
2: Kirkman Road & SR 408 EB Ramps

2022 AM Existing

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	328	0	202	0	0	0	0	707	413	60	933	0
Future Volume (vph)	328	0	202	0	0	0	0	707	413	60	933	0
Satd. Flow (prot)	3433	0	1583	0	0	0	0	6408	1583	1770	5085	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	3433	0	1583	0	0	0	0	6408	1583	1770	5085	0
Satd. Flow (RTOR)			230						469			
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	373	0	230	0	0	0	0	803	469	68	1060	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	373	0	230	0	0	0	0	803	469	68	1060	0
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	8							6		5	2	
Permitted Phases			8						6			
Total Split (s)	43.0		43.0					89.0	89.0	38.0	89.0	
Total Lost Time (s)	7.2		7.2					6.9	6.9	7.6	7.0	
Act Effct Green (s)	24.1		24.1					113.4	113.4	10.7	93.7	
Actuated g/C Ratio	0.14		0.14					0.67	0.67	0.06	0.55	
v/c Ratio	0.77		0.55					0.19	0.39	0.61	0.38	
Control Delay	80.7		11.8					11.5	2.0	131.3	11.7	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.2	
Total Delay	80.7		11.8					11.5	2.0	131.3	12.0	
LOS	F		B					B	A	F	B	
Approach Delay		54.4						8.0			19.2	
Approach LOS		D						A			B	
Queue Length 50th (ft)	210		0					93	0	65	154	
Queue Length 95th (ft)	252		73					128	40	85	158	
Internal Link Dist (ft)		1655			142			1141			446	
Turn Bay Length (ft)	300		300						250			
Base Capacity (vph)	722		514					4276	1212	316	2802	
Starvation Cap Reductn	0		0					0	0	0	883	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.52		0.45					0.19	0.39	0.22	0.55	
Intersection Summary												
Cycle Length: 170												
Actuated Cycle Length: 170												
Offset: 91 (54%), Referenced to phase 2:SBT and 6:NBT, Start of Green												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.77												
Intersection Signal Delay: 21.5												
Intersection LOS: C												

Lanes, Volumes, Timings
2: Kirkman Road & SR 408 EB Ramps

2022 AM Existing

Lane Group	Ø1	Ø4
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	1	4
Permitted Phases		
Total Split (s)	38.0	43.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings 2: Kirkman Road & SR 408 EB Ramps

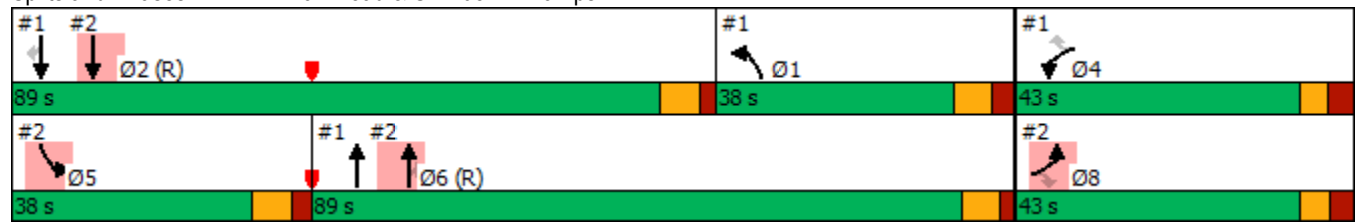
2022 AM Existing

Intersection Capacity Utilization 57.2%

ICU Level of Service B










Analysis Period (min) 15

Splits and Phases: 2: Kirkman Road & SR 408 EB Ramps












Lanes, Volumes, Timings
3: Pine Hills Road & SR 408 WB ramps

2022 AM Existing

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	35	242	421	0	0	835
Future Volume (vph)	35	242	421	0	0	835
Satd. Flow (prot)	1787	1599	3574	0	0	3574
Flt Permitted	0.950					
Satd. Flow (perm)	1787	1599	3574	0	0	3574
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	36	249	434	0	0	861
Shared Lane Traffic (%)						
Lane Group Flow (vph)	36	249	434	0	0	861
Sign Control	Stop		Free			Free
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 36.0%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings
4: Pine Hills Road & SR 408 EB Ramps

2022 AM Existing

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	421	121	249	621
Future Volume (vph)	0	0	421	121	249	621
Satd. Flow (prot)	0	0	3453	0	1787	3574
Flt Permitted					0.950	
Satd. Flow (perm)	0	0	3453	0	1787	3574
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	0	0	434	125	257	640
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	559	0	257	640
Sign Control	Stop		Free			Free
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 36.0%			ICU Level of Service A			
Analysis Period (min) 15						

Lanes, Volumes, Timings
5: SR 408 WB ramps & Old Winter Garden Road

2022 AM Existing

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↖	↗
Traffic Volume (vph)	822	0	0	571	319	92
Future Volume (vph)	822	0	0	571	319	92
Satd. Flow (prot)	3539	0	0	3539	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	3539	0	0	3539	1770	1583
Satd. Flow (RTOR)						98
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	874	0	0	607	339	98
Shared Lane Traffic (%)						
Lane Group Flow (vph)	874	0	0	607	339	98
Turn Type	NA			NA	Prot	Perm
Protected Phases	6			2	4	
Permitted Phases						4
Total Split (s)	90.0			90.0	40.0	40.0
Total Lost Time (s)	6.8			6.8	5.9	5.9
Act Effct Green (s)	88.3			88.3	29.0	29.0
Actuated g/C Ratio	0.68			0.68	0.22	0.22
v/c Ratio	0.36			0.25	0.86	0.23
Control Delay	9.9			8.9	69.0	8.3
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	9.9			8.9	69.0	8.3
LOS	A			A	E	A
Approach Delay	9.9			8.9	55.4	
Approach LOS	A			A	E	
Queue Length 50th (ft)	155			98	274	0
Queue Length 95th (ft)	212			138	374	44
Internal Link Dist (ft)	887			1119	1696	
Turn Bay Length (ft)					1000	
Base Capacity (vph)	2403			2403	464	487
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.36			0.25	0.73	0.20
Intersection Summary						
Cycle Length: 130						
Actuated Cycle Length: 130						
Offset: 3 (2%), Referenced to phase 2:WBT and 6:EBT, Start of Green						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.86						
Intersection Signal Delay: 20.0				Intersection LOS: B		

Lanes, Volumes, Timings
 5: SR 408 WB ramps & Old Winter Garden Road

2022 AM Existing

Intersection Capacity Utilization 51.0%

ICU Level of Service A



















Analysis Period (min) 15

Splits and Phases: 5: SR 408 WB ramps & Old Winter Garden Road



Lanes, Volumes, Timings
6: John Young Parkway & SR 408 WB ramps

2022 AM Existing

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	85	1374	0	0	1561	219	0	0	0	80	0	398
Future Volume (vph)	85	1374	0	0	1561	219	0	0	0	80	0	398
Satd. Flow (prot)	1719	4940	0	0	6225	1538	0	0	0	1719	0	2707
Flt Permitted	0.120									0.950		
Satd. Flow (perm)	217	4940	0	0	6225	1538	0	0	0	1719	0	2707
Satd. Flow (RTOR)					223							144
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	87	1402	0	0	1593	223	0	0	0	82	0	406
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	1402	0	0	1593	223	0	0	0	82	0	406
Turn Type	pm+pt	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases	2					6						3
Total Split (s)	20.0	130.0			110.0	110.0				40.0		40.0
Total Lost Time (s)	7.7	7.7			7.7	7.7				5.7		5.7
Act Effct Green (s)	133.8	133.8			113.8	113.8				22.8		22.8
Actuated g/C Ratio	0.79	0.79			0.67	0.67				0.13		0.13
v/c Ratio	0.31	0.36			0.38	0.20				0.36		0.83
Control Delay	15.1	1.3			13.3	1.8				69.6		60.5
Queue Delay	0.0	0.1			0.0	0.0				0.0		0.0
Total Delay	15.1	1.4			13.3	1.8				69.6		60.5
LOS	B	A			B	A				E		E
Approach Delay		2.2			11.9						62.0	
Approach LOS		A			B						E	
Queue Length 50th (ft)	14	0			216	0				84		168
Queue Length 95th (ft)	63	3			278	34				136		227
Internal Link Dist (ft)		347			2240			1041			1370	
Turn Bay Length (ft)						250				500		500
Base Capacity (vph)	279	3887			4166	1103				346		661
Starvation Cap Reductn	0	904			0	0				0		0
Spillback Cap Reductn	0	0			36	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.31	0.47			0.39	0.20				0.24		0.61
Intersection Summary												
Cycle Length: 170												
Actuated Cycle Length: 170												
Offset: 32 (19%), Referenced to phase 2:NBTL and 6:SBT, Start of Green												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.83												
Intersection Signal Delay: 14.5												
Intersection LOS: B												

Lanes, Volumes, Timings 6: John Young Parkway & SR 408 WB ramps

2022 AM Existing

Intersection Capacity Utilization 65.9%

ICU Level of Service C
























Analysis Period (min) 15

Splits and Phases: 6: John Young Parkway & SR 408 WB ramps



Lanes, Volumes, Timings
7: John Young Parkway & SR 408 EB Ramps

2022 AM Existing

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			  	
Traffic Volume (vph)	186	0	200	0	0	0	0	1273	106	325	1316	0
Future Volume (vph)	186	0	200	0	0	0	0	1273	106	325	1316	0
Satd. Flow (prot)	3367	0	1553	0	0	0	0	4988	1553	1736	4988	0
Flt Permitted	0.950									0.143		
Satd. Flow (perm)	3367	0	1553	0	0	0	0	4988	1553	261	4988	0
Satd. Flow (RTOR)			74						98			
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	198	0	213	0	0	0	0	1354	113	346	1400	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	198	0	213	0	0	0	0	1354	113	346	1400	0
Turn Type	Prot		Perm					NA	Perm	pm+pt	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4						2	6		
Total Split (s)	45.0		45.0					85.0	85.0	40.0	125.0	
Total Lost Time (s)	6.8		6.8					7.1	7.1	7.1	7.1	
Act Effct Green (s)	21.3		21.3					101.0	101.0	134.8	134.8	
Actuated g/C Ratio	0.13		0.13					0.59	0.59	0.79	0.79	
v/c Ratio	0.47		0.82					0.46	0.12	0.79	0.35	
Control Delay	71.4		70.5					22.0	5.5	68.5	4.0	
Queue Delay	0.0		0.0					0.0	0.0	1.9	0.1	
Total Delay	71.4		70.5					22.0	5.5	70.4	4.1	
LOS	E		E					C	A	E	A	
Approach Delay		71.0						20.7			17.2	
Approach LOS		E						C			B	
Queue Length 50th (ft)	107		156					295	7	227	82	
Queue Length 95th (ft)	142		243					450	47	326	86	
Internal Link Dist (ft)		1163			951			1113			347	
Turn Bay Length (ft)	450								250			
Base Capacity (vph)	756		406					2964	962	502	3955	
Starvation Cap Reductn	0		0					0	0	60	1047	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.26		0.52					0.46	0.12	0.78	0.48	
Intersection Summary												
Cycle Length: 170												
Actuated Cycle Length: 170												
Offset: 38 (22%), Referenced to phase 2:NBT and 6:SBTL, Start of Green												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.82												
Intersection Signal Delay: 24.7												
Intersection LOS: C												

Lanes, Volumes, Timings 7: John Young Parkway & SR 408 EB Ramps

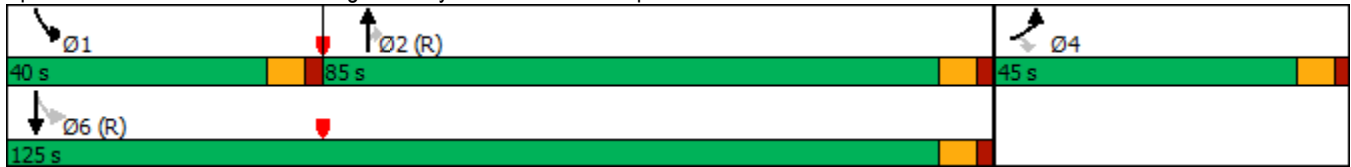
2022 AM Existing

Intersection Capacity Utilization 65.9%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: John Young Parkway & SR 408 EB Ramps



Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	9:27	9:27	9:27	9:27	9:27	9:27	9:27
Total Time (min)	150	150	150	150	150	150	150
Time Recorded (min)	120	120	120	120	120	120	120
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	20573	20617	20633	20855	20656	20852	20948
Vehs Exited	20558	20580	20594	20810	20635	20843	20927
Starting Vehs	216	219	233	202	222	223	202
Ending Vehs	231	256	272	247	243	232	223
Denied Entry Before	3	1	2	5	5	0	4
Denied Entry After	4	2	2	1	1	2	2
Travel Distance (mi)	11258	11304	11338	11439	11335	11415	11465
Travel Time (hr)	483.7	490.9	493.8	498.0	493.5	492.3	496.8
Total Delay (hr)	149.8	156.2	157.9	159.0	157.0	153.4	156.5
Total Stops	11015	11331	11407	11360	11332	11329	11386
Fuel Used (gal)	379.0	382.3	384.2	387.0	383.3	385.0	387.2

Summary of All Intervals

Run Number	8	9	10	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	9:27	9:27	9:27	9:27
Total Time (min)	150	150	150	150
Time Recorded (min)	120	120	120	120
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	20709	21109	20805	20774
Vehs Exited	20748	21119	20775	20760
Starting Vehs	263	232	224	220
Ending Vehs	224	222	254	241
Denied Entry Before	2	0	2	0
Denied Entry After	1	1	0	0
Travel Distance (mi)	11378	11551	11377	11386
Travel Time (hr)	499.6	501.9	495.7	494.6
Total Delay (hr)	162.2	159.6	157.6	156.9
Total Stops	11636	11504	11562	11387
Fuel Used (gal)	385.6	390.4	385.5	384.9

Interval #0 Information Seeding

Start Time	6:57
End Time	7:27
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:27
End Time	9:27
Total Time (min)	120

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	6	7
Vehs Entered	20573	20617	20633	20855	20656	20852	20948
Vehs Exited	20558	20580	20594	20810	20635	20843	20927
Starting Vehs	216	219	233	202	222	223	202
Ending Vehs	231	256	272	247	243	232	223
Denied Entry Before	3	1	2	5	5	0	4
Denied Entry After	4	2	2	1	1	2	2
Travel Distance (mi)	11258	11304	11338	11439	11335	11415	11465
Travel Time (hr)	483.7	490.9	493.8	498.0	493.5	492.3	496.8
Total Delay (hr)	149.8	156.2	157.9	159.0	157.0	153.4	156.5
Total Stops	11015	11331	11407	11360	11332	11329	11386
Fuel Used (gal)	379.0	382.3	384.2	387.0	383.3	385.0	387.2

Interval #1 Information Recording

Start Time	7:27
End Time	9:27
Total Time (min)	120

Volumes adjusted by Growth Factors.

Run Number	8	9	10	Avg
Vehs Entered	20709	21109	20805	20774
Vehs Exited	20748	21119	20775	20760
Starting Vehs	263	232	224	220
Ending Vehs	224	222	254	241
Denied Entry Before	2	0	2	0
Denied Entry After	1	1	0	0
Travel Distance (mi)	11378	11551	11377	11386
Travel Time (hr)	499.6	501.9	495.7	494.6
Total Delay (hr)	162.2	159.6	157.6	156.9
Total Stops	11636	11504	11562	11387
Fuel Used (gal)	385.6	390.4	385.5	384.9

1: Kirkman Road & SR 408 WB ramps Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.1	0.2	0.0	0.0	0.1	0.2	0.6
Denied Del/Veh (s)	0.5	3.2	0.0	0.0	0.2	2.9	0.5
Total Delay (hr)	11.0	0.4	3.4	7.7	8.2	0.2	31.0
Total Del/Veh (s)	65.2	6.4	49.8	15.3	21.4	2.6	24.4
Travel Time (hr)	16.1	2.6	4.3	12.8	13.4	1.7	50.9
Avg Speed (mph)	8	19	6	14	17	30	13
Vehicles Entered	598	229	244	1807	1382	290	4550
Vehicles Exited	602	230	248	1798	1375	291	4544
Hourly Exit Rate	301	115	124	899	688	146	2272
Input Volume	297	116	130	905	696	143	2287
% of Volume	101	99	95	99	99	102	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

2: Kirkman Road & SR 408 EB Ramps Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.1	0.3	0.2	0.6	0.0	0.0	1.2
Denied Del/Veh (s)	0.6	2.5	0.6	2.7	0.0	0.0	0.9
Total Delay (hr)	12.0	1.0	4.2	0.8	4.2	5.7	27.9
Total Del/Veh (s)	66.2	9.2	10.7	3.4	126.9	11.0	19.0
Travel Time (hr)	19.3	5.9	11.6	6.6	4.5	10.9	58.8
Avg Speed (mph)	11	23	28	31	3	18	18
Vehicles Entered	642	401	1408	835	116	1861	5263
Vehicles Exited	645	401	1406	836	116	1853	5257
Hourly Exit Rate	323	201	703	418	58	927	2629
Input Volume	328	202	707	413	60	933	2643
% of Volume	98	99	99	101	97	99	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

3: Pine Hills Road & SR 408 WB ramps Performance by movement

Movement	WBL	WBR	NBT	SBT	All
Denied Delay (hr)	0.1	0.0	0.0	0.1	0.2
Denied Del/Veh (s)	3.0	0.3	0.0	0.2	0.2
Total Delay (hr)	0.4	0.6	0.1	0.2	1.3
Total Del/Veh (s)	21.4	4.6	0.3	0.4	1.5
Travel Time (hr)	1.0	4.5	1.1	5.6	12.2
Avg Speed (mph)	16	23	37	34	29
Vehicles Entered	68	480	840	1655	3043
Vehicles Exited	67	480	839	1654	3040
Hourly Exit Rate	34	240	420	827	1520
Input Volume	35	242	421	835	1533
% of Volume	96	99	100	99	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

4: Pine Hills Road & SR 408 EB Ramps Performance by movement

Movement	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.0
Total Delay (hr)	0.2	0.1	0.7	0.1	0.9
Total Del/Veh (s)	0.7	0.8	4.9	0.2	1.2
Travel Time (hr)	4.2	1.4	1.7	1.9	9.3
Avg Speed (mph)	38	31	15	35	32
Vehicles Entered	839	234	498	1224	2795
Vehicles Exited	840	234	498	1224	2796
Hourly Exit Rate	420	117	249	612	1398
Input Volume	421	121	249	621	1412
% of Volume	100	97	100	99	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

5: SR 408 WB ramps & Old Winter Garden Road Performance by movement

Movement	EBT	WBT	NBL	NBR	All
Denied Delay (hr)	0.1	0.0	0.4	0.0	0.5
Denied Del/Veh (s)	0.1	0.1	2.0	0.6	0.5
Total Delay (hr)	4.3	2.7	9.6	0.4	17.0
Total Del/Veh (s)	9.4	8.3	53.9	7.1	16.8
Travel Time (hr)	11.0	8.4	18.5	3.0	40.8
Avg Speed (mph)	27	30	11	21	20
Vehicles Entered	1646	1145	634	186	3611
Vehicles Exited	1645	1146	627	186	3604
Hourly Exit Rate	823	573	314	93	1802
Input Volume	822	571	319	92	1804
% of Volume	100	100	98	101	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

6: John Young Parkway & SR 408 WB ramps Performance by movement

Movement	NBL	NBT	SBT	SBR	NWL	NWR	All
Denied Delay (hr)	0.0	0.0	0.4	0.2	0.1	0.1	0.8
Denied Del/Veh (s)	0.0	0.0	0.4	1.5	2.8	0.5	0.4
Total Delay (hr)	2.5	2.9	8.0	0.7	3.4	5.0	22.5
Total Del/Veh (s)	53.3	3.8	9.2	5.8	75.3	22.2	10.8
Travel Time (hr)	3.0	8.7	38.1	4.7	4.9	13.0	72.4
Avg Speed (mph)	5	27	35	36	9	16	28
Vehicles Entered	165	2776	3113	432	157	802	7445
Vehicles Exited	167	2772	3106	432	160	805	7442
Hourly Exit Rate	84	1386	1553	216	80	403	3721
Input Volume	85	1389	1561	219	80	398	3732
% of Volume	98	100	99	99	100	101	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

7: John Young Parkway & SR 408 EB Ramps Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.4	0.1	0.1	0.1	0.0	0.0	0.7
Denied Del/Veh (s)	3.6	0.7	0.2	2.3	0.2	0.0	0.4
Total Delay (hr)	7.6	1.3	15.0	0.3	11.8	3.8	39.7
Total Del/Veh (s)	71.5	11.5	21.2	4.3	65.7	5.1	20.8
Travel Time (hr)	10.3	4.0	27.3	1.5	13.7	9.4	66.2
Avg Speed (mph)	8	23	20	31	4	25	16
Vehicles Entered	376	403	2543	219	636	2656	6833
Vehicles Exited	380	401	2530	218	641	2652	6822
Hourly Exit Rate	190	201	1265	109	321	1326	3411
Input Volume	186	200	1273	106	325	1332	3422
% of Volume	102	100	99	103	99	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Denied Delay (hr)	4.1
Denied Del/Veh (s)	0.7
Total Delay (hr)	152.8
Total Del/Veh (s)	26.2
Travel Time (hr)	494.6
Avg Speed (mph)	23
Vehicles Entered	20774
Vehicles Exited	20760
Hourly Exit Rate	10380
Input Volume	27962
% of Volume	37
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Kirkman Road & SR 408 WB ramps

Movement	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	T	T
Maximum Queue (ft)	240	263	90	212	192	218	243	298	254	174
Average Queue (ft)	136	166	32	94	87	118	134	180	130	32
95th Queue (ft)	219	239	61	167	164	207	231	270	234	115
Link Distance (ft)		1064		448	448	448	448	862	862	862
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	400		400							
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: Kirkman Road & SR 408 EB Ramps

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	T	T	T	T	L	T	T	T
Maximum Queue (ft)	261	281	150	128	211	191	93	155	165	217	233
Average Queue (ft)	139	163	56	32	95	59	8	62	62	92	102
95th Queue (ft)	222	236	101	83	178	145	37	123	129	184	208
Link Distance (ft)		1674			1184	1184	1184	448	448	448	448
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	300		300	400							
Storage Blk Time (%)	0	0									
Queuing Penalty (veh)	0	0									

Intersection: 3: Pine Hills Road & SR 408 WB ramps

Movement	WB	WB
Directions Served	L	R
Maximum Queue (ft)	81	110
Average Queue (ft)	26	48
95th Queue (ft)	58	77
Link Distance (ft)		1124
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	350	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Pine Hills Road & SR 408 EB Ramps

Movement	NB	NB	SB
Directions Served	T	TR	L
Maximum Queue (ft)	2	24	102
Average Queue (ft)	0	2	46
95th Queue (ft)	1	13	78
Link Distance (ft)	1006	1006	225
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: SR 408 WB ramps & Old Winter Garden Road

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	T	T	T	L	R
Maximum Queue (ft)	240	205	184	152	443	93
Average Queue (ft)	123	77	84	49	239	37
95th Queue (ft)	199	159	149	111	368	70
Link Distance (ft)	946	946	1165	1165		1730
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					1000	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: John Young Parkway & SR 408 WB ramps

Movement	NB	NB	NB	NB	SB	SB	SB	SB	NW	NW	NW
Directions Served	L	T	T	T	T	T	T	T	L	R	R
Maximum Queue (ft)	166	121	96	104	212	196	207	180	198	204	173
Average Queue (ft)	58	6	5	11	51	81	84	60	81	102	62
95th Queue (ft)	125	40	36	48	144	170	175	144	151	168	143
Link Distance (ft)	322	322	322	322		2222	2222	2222		1372	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					350				500		500
Storage Blk Time (%)					0						
Queuing Penalty (veh)					0						

Intersection: 7: John Young Parkway & SR 408 EB Ramps

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	T	T	T	R	L	T	T	T
Maximum Queue (ft)	195	226	176	416	380	316	43	357	148	149	147
Average Queue (ft)	81	129	54	233	193	120	1	236	59	61	49
95th Queue (ft)	175	195	109	361	326	254	24	365	121	124	114
Link Distance (ft)			1171	1113	1113	1113		322	322	322	322
Upstream Blk Time (%)								6			
Queuing Penalty (veh)								26			
Storage Bay Dist (ft)	450	450					250				
Storage Blk Time (%)							0				
Queuing Penalty (veh)							0				

Intersection: 28: Bend



















Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	45	49
Average Queue (ft)	1	1
95th Queue (ft)	14	14
Link Distance (ft)	115	115
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 26

Lanes, Volumes, Timings
1: Kirkman Road & SR 408 WB ramps

2022 PM Existing

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	325	0	207	184	1208	0	0	889	231
Future Volume (vph)	0	0	0	325	0	207	184	1208	0	0	889	231
Satd. Flow (prot)	0	0	0	3467	0	1599	1787	5136	0	0	5136	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3467	0	1599	1787	5136	0	0	5136	1599
Satd. Flow (RTOR)						218						243
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	0	0	342	0	218	194	1272	0	0	936	243
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	342	0	218	194	1272	0	0	936	243
Turn Type				Prot		Perm	Prot	NA			NA	Perm
Protected Phases				4			1	6			2	
Permitted Phases						4						2
Total Split (s)				57.0		57.0	54.0	97.0			69.0	69.0
Total Lost Time (s)				7.0		7.0	7.9	6.9			7.0	7.0
Act Effct Green (s)				23.6		23.6	23.9	116.5			110.6	110.6
Actuated g/C Ratio				0.13		0.13	0.13	0.65			0.61	0.61
v/c Ratio				0.75		0.55	0.82	0.38			0.30	0.23
Control Delay				85.9		12.7	89.5	6.7			17.7	2.5
Queue Delay				0.0		0.0	0.0	0.1			0.0	0.0
Total Delay				85.9		12.7	89.5	6.8			17.7	2.5
LOS				F		B	F	A			B	A
Approach Delay					57.4			17.8			14.6	
Approach LOS					E			B			B	
Queue Length 50th (ft)				204		0	136	115			183	0
Queue Length 95th (ft)				253		82	160	125			258	45
Internal Link Dist (ft)		526			1048			446			818	
Turn Bay Length (ft)				400		400						300
Base Capacity (vph)				963		601	457	3324			3155	1076
Starvation Cap Reductn				0		0	0	783			0	0
Spillback Cap Reductn				0		0	0	0			33	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.36		0.36	0.42	0.50			0.30	0.23
Intersection Summary												
Cycle Length: 180												
Actuated Cycle Length: 180												
Offset: 81 (45%), Referenced to phase 2:SBT and 6:NBT, Start of Green												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.82												
Intersection Signal Delay: 23.5						Intersection LOS: C						

Lane Group	Ø5	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	8
Permitted Phases		
Total Split (s)	26.0	57.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings 1: Kirkman Road & SR 408 WB ramps

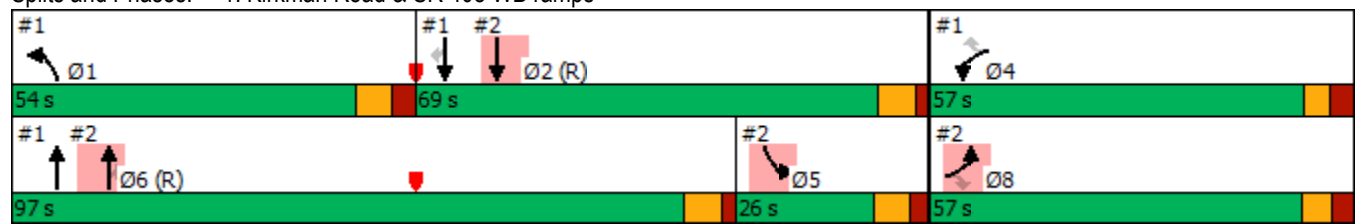
2022 PM Existing

Intersection Capacity Utilization 54.9%

ICU Level of Service A

Analysis Period (min) 15
























Splits and Phases: 1: Kirkman Road & SR 408 WB ramps



Lanes, Volumes, Timings

2: Kirkman Road & SR 408 EB Ramps

2022 PM Existing

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			  	
Traffic Volume (vph)	196	0	209	0	0	0	0	1196	413	87	1127	0
Future Volume (vph)	196	0	209	0	0	0	0	1196	413	87	1127	0
Satd. Flow (prot)	3467	0	1599	0	0	0	0	6471	1599	1787	5136	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	3467	0	1599	0	0	0	0	6471	1599	1787	5136	0
Satd. Flow (RTOR)			227						449			
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	213	0	227	0	0	0	0	1300	449	95	1225	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	213	0	227	0	0	0	0	1300	449	95	1225	0
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	8							6		5	2	
Permitted Phases			8						6			
Total Split (s)	57.0		57.0					97.0	97.0	26.0	69.0	
Total Lost Time (s)	7.2		7.2					6.9	6.9	7.6	7.0	
Act Effct Green (s)	23.4		23.4					116.5	116.5	18.4	110.6	
Actuated g/C Ratio	0.13		0.13					0.65	0.65	0.10	0.61	
v/c Ratio	0.47		0.56					0.31	0.38	0.52	0.39	
Control Delay	75.4		12.7					14.6	2.0	69.4	19.6	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.2	
Total Delay	75.4		12.7					14.6	2.0	69.4	19.8	
LOS	E		B					B	A	E	B	
Approach Delay		43.0						11.3			23.4	
Approach LOS		D						B			C	
Queue Length 50th (ft)	122		0					187	0	101	175	
Queue Length 95th (ft)	162		84					231	45	155	206	
Internal Link Dist (ft)		1655			142			1141			446	
Turn Bay Length (ft)	300		300						250			
Base Capacity (vph)	959		606					4188	1193	182	3155	
Starvation Cap Reductn	0		0					0	0	0	916	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.22		0.37					0.31	0.38	0.52	0.55	
Intersection Summary												
Cycle Length: 180												
Actuated Cycle Length: 180												
Offset: 81 (45%), Referenced to phase 2:SBT and 6:NBT, Start of Green												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.82												
Intersection Signal Delay: 19.8												
Intersection LOS: B												

Lane Group	Ø1	Ø4
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	1	4
Permitted Phases		
Total Split (s)	54.0	57.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings 2: Kirkman Road & SR 408 EB Ramps

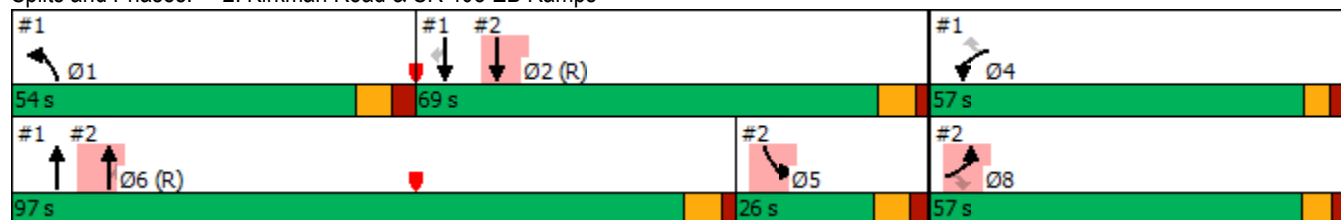
2022 PM Existing

Intersection Capacity Utilization 54.9%

ICU Level of Service A












Analysis Period (min) 15

Splits and Phases: 2: Kirkman Road & SR 408 EB Ramps












Lanes, Volumes, Timings
3: Pine Hills Road & SR 408 WB ramps

2022 PM Existing

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	39	297	629	0	0	787
Future Volume (vph)	39	297	629	0	0	787
Satd. Flow (prot)	1787	1599	3574	0	0	3574
Flt Permitted	0.950					
Satd. Flow (perm)	1787	1599	3574	0	0	3574
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	40	303	642	0	0	803
Shared Lane Traffic (%)						
Lane Group Flow (vph)	40	303	642	0	0	803
Sign Control	Stop		Free			Free
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 42.4%				ICU Level of Service A		
Analysis Period (min) 15						







Lanes, Volumes, Timings
4: Pine Hills Road & SR 408 EB Ramps

2022 PM Existing

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	629	157	168	658
Future Volume (vph)	0	0	629	157	168	658
Satd. Flow (prot)	0	0	3467	0	1787	3574
Flt Permitted					0.950	
Satd. Flow (perm)	0	0	3467	0	1787	3574
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	0	0	642	160	171	671
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	802	0	171	671
Sign Control	Stop		Free			Free
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 42.4%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings
5: SR 408 WB ramps & Old Winter Garden Road

2022 PM Existing

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↵	↵
Traffic Volume (vph)	668	0	0	999	212	44
Future Volume (vph)	668	0	0	999	212	44
Satd. Flow (prot)	3574	0	0	3574	1787	1599
Flt Permitted					0.950	
Satd. Flow (perm)	3574	0	0	3574	1787	1599
Satd. Flow (RTOR)						46
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	703	0	0	1052	223	46
Shared Lane Traffic (%)						
Lane Group Flow (vph)	703	0	0	1052	223	46
Turn Type	NA			NA	Prot	Perm
Protected Phases	6			2	4	
Permitted Phases						4
Total Split (s)	110.0			110.0	40.0	40.0
Total Lost Time (s)	6.8			6.8	5.9	5.9
Act Effct Green (s)	113.3			113.3	24.0	24.0
Actuated g/C Ratio	0.76			0.76	0.16	0.16
v/c Ratio	0.26			0.39	0.78	0.16
Control Delay	6.3			7.3	78.8	13.9
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	6.3			7.3	78.8	13.9
LOS	A			A	E	B
Approach Delay	6.3			7.3	67.7	
Approach LOS	A			A	E	
Queue Length 50th (ft)	98			167	212	0
Queue Length 95th (ft)	150			248	292	36
Internal Link Dist (ft)	887			1119	1696	
Turn Bay Length (ft)					1000	
Base Capacity (vph)	2700			2700	406	399
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.26			0.39	0.55	0.12
Intersection Summary						
Cycle Length: 150						
Actuated Cycle Length: 150						
Offset: 130 (87%), Referenced to phase 2:WBT and 6:EBT, Start of Green						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.78						
Intersection Signal Delay: 15.0				Intersection LOS: B		

Lanes, Volumes, Timings 5: SR 408 WB ramps & Old Winter Garden Road




2022 PM Existing

Intersection Capacity Utilization 49.9%

ICU Level of Service A



















Analysis Period (min) 15

Splits and Phases: 5: SR 408 WB ramps & Old Winter Garden Road

 Ø2 (R) 110 s	 Ø4 40 s
 Ø6 (R) 110 s	

Lanes, Volumes, Timings
6: John Young Parkway & SR 408 WB ramps

2022 PM Existing

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	145	1500	0	0	1771	356	0	0	0	60	0	227
Future Volume (vph)	145	1500	0	0	1771	356	0	0	0	60	0	227
Satd. Flow (prot)	1770	5085	0	0	6408	1583	0	0	0	1770	0	2787
Flt Permitted	0.083									0.950		
Satd. Flow (perm)	155	5085	0	0	6408	1583	0	0	0	1770	0	2787
Satd. Flow (RTOR)					375							134
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	153	1579	0	0	1864	375	0	0	0	63	0	239
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	1579	0	0	1864	375	0	0	0	63	0	239
Turn Type	pm+pt	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases	2					6						3
Total Split (s)	35.0	150.0			115.0	115.0				30.0		30.0
Total Lost Time (s)	7.7	7.7			7.7	7.7				5.7		5.7
Act Effct Green (s)	154.0	154.0			119.0	119.0				12.6		12.6
Actuated g/C Ratio	0.86	0.86			0.66	0.66				0.07		0.07
v/c Ratio	0.41	0.36			0.44	0.32				0.51		0.75
Control Delay	47.8	0.9			15.3	1.8				93.9		49.9
Queue Delay	0.0	0.2			0.1	0.0				0.0		0.0
Total Delay	47.8	1.0			15.3	1.8				93.9		49.9
LOS	D	A			B	A				F		D
Approach Delay		5.2			13.1						59.1	
Approach LOS		A			B						E	
Queue Length 50th (ft)	85	1			291	0				73		69
Queue Length 95th (ft)	169	2			347	40				126		123
Internal Link Dist (ft)		347			2240			1041			1370	
Turn Bay Length (ft)						250				500		500
Base Capacity (vph)	377	4350			4235	1173				238		492
Starvation Cap Reductn	0	1509			0	0				0		0
Spillback Cap Reductn	0	0			568	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.41	0.56			0.51	0.32				0.26		0.49
Intersection Summary												
Cycle Length: 180												
Actuated Cycle Length: 180												
Offset: 74 (41%), Referenced to phase 2:NBTL and 6:SBT, Start of Green												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.75												
Intersection Signal Delay: 13.1												
Intersection LOS: B												

Lanes, Volumes, Timings 6: John Young Parkway & SR 408 WB ramps

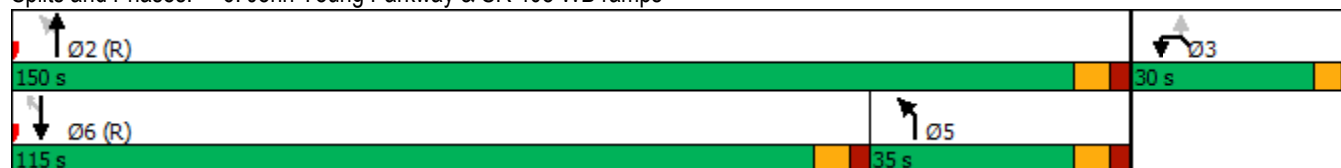
2022 PM Existing

Intersection Capacity Utilization 80.1%

ICU Level of Service D
























Analysis Period (min) 15

Splits and Phases: 6: John Young Parkway & SR 408 WB ramps



Lanes, Volumes, Timings
7: John Young Parkway & SR 408 EB Ramps

2022 PM Existing

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			  	
Traffic Volume (vph)	149	0	128	0	0	0	0	1496	159	503	1328	0
Future Volume (vph)	149	0	128	0	0	0	0	1496	159	503	1328	0
Satd. Flow (prot)	3433	0	1583	0	0	0	0	5085	1583	1770	5085	0
Flt Permitted	0.950									0.098		
Satd. Flow (perm)	3433	0	1583	0	0	0	0	5085	1583	183	5085	0
Satd. Flow (RTOR)			111						118			
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	154	0	132	0	0	0	0	1542	164	519	1369	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	154	0	132	0	0	0	0	1542	164	519	1369	0
Turn Type	Prot		Perm					NA	Perm	pm+pt	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4						2	6		
Total Split (s)	30.0		30.0					90.0	90.0	60.0	150.0	
Total Lost Time (s)	6.8		6.8					7.1	7.1	7.1	7.1	
Act Effct Green (s)	13.4		13.4					96.5	96.5	152.7	152.7	
Actuated g/C Ratio	0.07		0.07					0.54	0.54	0.85	0.85	
v/c Ratio	0.60		0.60					0.57	0.18	0.88	0.32	
Control Delay	90.5		30.0					30.3	8.3	93.2	2.9	
Queue Delay	0.0		0.0					0.0	0.0	54.3	0.1	
Total Delay	90.5		30.0					30.3	8.3	147.5	3.0	
LOS	F		C					C	A	F	A	
Approach Delay		62.6						28.2			42.7	
Approach LOS		E						C			D	
Queue Length 50th (ft)	92		24					443	26	540	95	
Queue Length 95th (ft)	132		99					565	79	670	117	
Internal Link Dist (ft)		1163			951			1113			347	
Turn Bay Length (ft)	450								250			
Base Capacity (vph)	442		300					2725	903	637	4313	
Starvation Cap Reductn	0		0					0	0	278	1499	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.35		0.44					0.57	0.18	1.45	0.49	
Intersection Summary												
Cycle Length: 180												
Actuated Cycle Length: 180												
Offset: 72 (40%), Referenced to phase 2:NBT and 6:SBTL, Start of Green												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.88												
Intersection Signal Delay: 37.8												
Intersection LOS: D												

Lanes, Volumes, Timings 7: John Young Parkway & SR 408 EB Ramps

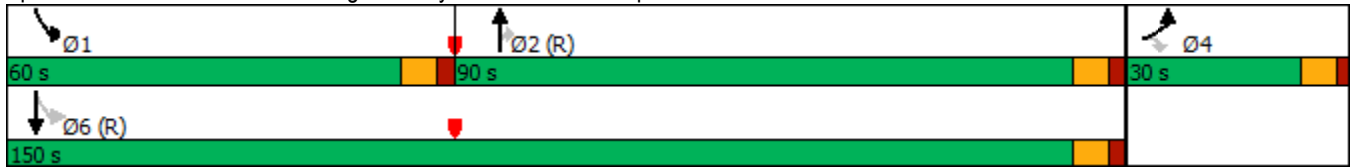
2022 PM Existing

Intersection Capacity Utilization 80.1%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 7: John Young Parkway & SR 408 EB Ramps



Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	5:00	5:00	5:00	5:00	5:00	5:00	5:00
End Time	7:30	7:30	7:30	7:30	7:30	7:30	7:30
Total Time (min)	150	150	150	150	150	150	150
Time Recorded (min)	120	120	120	120	120	120	120
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	23026	23130	22887	23325	23030	23226	23002
Vehs Exited	23054	23072	22885	23249	22999	23196	23019
Starting Vehs	362	360	369	294	349	366	374
Ending Vehs	334	418	371	370	380	396	357
Denied Entry Before	2	3	3	4	2	3	1
Denied Entry After	473	606	706	378	683	636	897
Travel Distance (mi)	12322	12364	12234	12507	12318	12402	12288
Travel Time (hr)	1229.8	1429.9	1490.5	1052.4	1368.6	1326.9	1663.9
Total Delay (hr)	868.4	1068.1	1132.2	686.5	1007.2	963.2	1303.2
Total Stops	14868	14688	14642	14990	14915	14936	14443
Fuel Used (gal)	585.4	632.9	641.2	548.0	617.0	607.7	681.5

Summary of All Intervals

Run Number	8	9	10	Avg
Start Time	5:00	5:00	5:00	5:00
End Time	7:30	7:30	7:30	7:30
Total Time (min)	150	150	150	150
Time Recorded (min)	120	120	120	120
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	22922	23052	23007	23062
Vehs Exited	22909	23047	22963	23040
Starting Vehs	368	386	345	360
Ending Vehs	381	391	389	379
Denied Entry Before	1	17	3	2
Denied Entry After	760	844	844	682
Travel Distance (mi)	12208	12322	12299	12326
Travel Time (hr)	1389.3	1530.7	1485.0	1396.7
Total Delay (hr)	1030.4	1168.8	1124.2	1035.2
Total Stops	14368	14467	14840	14715
Fuel Used (gal)	615.9	652.5	642.3	622.4

Interval #0 Information Seeding

Start Time	5:00
End Time	5:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	5:30
End Time	7:30
Total Time (min)	120

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	6	7
Vehs Entered	23026	23130	22887	23325	23030	23226	23002
Vehs Exited	23054	23072	22885	23249	22999	23196	23019
Starting Vehs	362	360	369	294	349	366	374
Ending Vehs	334	418	371	370	380	396	357
Denied Entry Before	2	3	3	4	2	3	1
Denied Entry After	473	606	706	378	683	636	897
Travel Distance (mi)	12322	12364	12234	12507	12318	12402	12288
Travel Time (hr)	1229.8	1429.9	1490.5	1052.4	1368.6	1326.9	1663.9
Total Delay (hr)	868.4	1068.1	1132.2	686.5	1007.2	963.2	1303.2
Total Stops	14868	14688	14642	14990	14915	14936	14443
Fuel Used (gal)	585.4	632.9	641.2	548.0	617.0	607.7	681.5

Interval #1 Information Recording

Start Time	5:30
End Time	7:30
Total Time (min)	120

Volumes adjusted by Growth Factors.

Run Number	8	9	10	Avg
Vehs Entered	22922	23052	23007	23062
Vehs Exited	22909	23047	22963	23040
Starting Vehs	368	386	345	360
Ending Vehs	381	391	389	379
Denied Entry Before	1	17	3	2
Denied Entry After	760	844	844	682
Travel Distance (mi)	12208	12322	12299	12326
Travel Time (hr)	1389.3	1530.7	1485.0	1396.7
Total Delay (hr)	1030.4	1168.8	1124.2	1035.2
Total Stops	14368	14467	14840	14715
Fuel Used (gal)	615.9	652.5	642.3	622.4

1: Kirkman Road & SR 408 WB ramps Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.1	0.4	0.0	0.0	0.1	0.3	0.9
Denied Del/Veh (s)	0.8	3.1	0.0	0.0	0.2	2.5	0.5
Total Delay (hr)	13.3	1.3	9.8	5.7	9.2	0.4	39.8
Total Del/Veh (s)	72.9	11.5	94.8	8.5	18.3	3.1	23.4
Travel Time (hr)	19.0	5.4	11.1	11.8	15.8	2.7	65.8
Avg Speed (mph)	7	17	3	21	19	29	13
Vehicles Entered	657	415	368	2423	1786	452	6101
Vehicles Exited	655	416	366	2423	1786	452	6098
Hourly Exit Rate	328	208	183	1212	893	226	3049
Input Volume	325	207	184	1208	889	231	3044
% of Volume	101	100	99	100	100	98	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

2: Kirkman Road & SR 408 EB Ramps Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.1	0.3	0.4	0.5	0.0	0.0	1.2
Denied Del/Veh (s)	0.6	2.6	0.5	2.2	0.0	0.0	0.7
Total Delay (hr)	7.7	1.2	10.3	0.8	2.8	12.4	35.1
Total Del/Veh (s)	68.7	10.0	15.3	3.7	57.0	19.5	19.3
Travel Time (hr)	12.2	6.3	22.8	6.5	3.3	18.6	69.8
Avg Speed (mph)	10	22	24	31	5	13	18
Vehicles Entered	402	422	2389	833	174	2268	6488
Vehicles Exited	402	423	2389	835	173	2267	6489
Hourly Exit Rate	201	212	1195	418	87	1134	3245
Input Volume	196	209	1196	413	87	1127	3228
% of Volume	103	101	100	101	99	101	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

3: Pine Hills Road & SR 408 WB ramps Performance by movement

Movement	WBL	WBR	NBT	SBT	All
Denied Delay (hr)	0.1	0.1	0.0	0.1	0.2
Denied Del/Veh (s)	2.9	0.3	0.0	0.2	0.2
Total Delay (hr)	0.5	1.0	0.1	0.1	1.8
Total Del/Veh (s)	25.6	6.0	0.4	0.3	1.9
Travel Time (hr)	1.2	5.8	1.8	5.3	14.0
Avg Speed (mph)	14	22	36	34	28
Vehicles Entered	77	597	1247	1556	3477
Vehicles Exited	77	598	1248	1555	3478
Hourly Exit Rate	39	299	624	778	1739
Input Volume	39	297	629	787	1752
% of Volume	99	101	99	99	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

4: Pine Hills Road & SR 408 EB Ramps Performance by movement

Movement	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.1
Total Delay (hr)	0.3	0.1	0.6	0.1	1.1
Total Del/Veh (s)	1.0	1.1	6.3	0.2	1.2
Travel Time (hr)	6.4	2.0	1.3	2.0	11.7
Avg Speed (mph)	38	31	14	35	33
Vehicles Entered	1246	323	330	1304	3203
Vehicles Exited	1247	323	331	1304	3205
Hourly Exit Rate	624	162	166	652	1603
Input Volume	629	157	168	659	1613
% of Volume	99	103	99	99	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

5: SR 408 WB ramps & Old Winter Garden Road Performance by movement

Movement	EBT	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.1	0.2	0.0	0.4
Denied Del/Veh (s)	0.1	0.2	2.1	0.5	0.4
Total Delay (hr)	2.3	4.1	7.6	0.1	14.2
Total Del/Veh (s)	6.2	7.3	63.9	5.6	13.1
Travel Time (hr)	7.8	14.2	13.5	1.4	37.0
Avg Speed (mph)	31	32	10	21	23
Vehicles Entered	1349	2016	422	92	3879
Vehicles Exited	1350	2016	422	92	3880
Hourly Exit Rate	675	1008	211	46	1940
Input Volume	668	999	212	44	1923
% of Volume	101	101	100	105	101
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

6: John Young Parkway & SR 408 WB ramps Performance by movement

Movement	NBL	NBT	SBT	SBR	NWL	NWR	All
Denied Delay (hr)	0.0	0.0	541.5	110.7	0.1	0.0	652.4
Denied Del/Veh (s)	0.0	0.0	552.9	555.2	3.3	0.4	289.0
Total Delay (hr)	4.6	3.4	200.6	2.9	2.7	2.9	217.2
Total Del/Veh (s)	56.6	4.0	236.4	17.3	82.9	22.5	103.4
Travel Time (hr)	5.5	9.5	770.1	119.0	3.9	7.5	915.5
Avg Speed (mph)	4	27	5	28	8	16	7
Vehicles Entered	286	3017	2959	603	117	464	7446
Vehicles Exited	288	3017	2937	602	116	464	7424
Hourly Exit Rate	144	1509	1469	301	58	232	3712
Input Volume	145	1500	1771	356	60	227	4059
% of Volume	99	101	83	85	97	102	91
Denied Entry Before	0	0	2	0	0	0	2
Denied Entry After	0	0	567	115	0	0	682

7: John Young Parkway & SR 408 EB Ramps Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.3	0.0	0.2	0.2	0.0	0.0	0.7
Denied Del/Veh (s)	3.7	0.6	0.2	2.1	0.1	0.0	0.4
Total Delay (hr)	6.4	0.8	22.9	0.5	20.3	3.6	54.6
Total Del/Veh (s)	77.2	11.7	27.3	5.4	88.4	5.8	28.1
Travel Time (hr)	8.5	2.5	37.5	2.3	22.8	8.4	82.1
Avg Speed (mph)	8	23	17	30	3	24	14
Vehicles Entered	298	256	3005	322	811	2244	6936
Vehicles Exited	298	256	3005	323	812	2244	6938
Hourly Exit Rate	149	128	1503	162	406	1122	3469
Input Volume	149	128	1496	159	503	1329	3764
% of Volume	100	100	100	102	81	84	92
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Denied Delay (hr)	656.0
Denied Del/Veh (s)	99.5
Total Delay (hr)	379.3
Total Del/Veh (s)	58.3
Travel Time (hr)	1396.7
Avg Speed (mph)	17
Vehicles Entered	23062
Vehicles Exited	23040
Hourly Exit Rate	11520
Input Volume	32142
% of Volume	36
Denied Entry Before	2
Denied Entry After	682

Intersection: 1: Kirkman Road & SR 408 WB ramps

Movement	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	T	T
Maximum Queue (ft)	285	312	189	332	137	170	180	348	312	206
Average Queue (ft)	153	182	61	165	50	81	98	185	133	50
95th Queue (ft)	239	263	122	273	104	144	162	308	266	154
Link Distance (ft)		1064		448	448	448	448	862	862	862
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	400		400							
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: Kirkman Road & SR 408 EB Ramps

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	T	T	T	T	L	T	T	T
Maximum Queue (ft)	197	209	150	214	294	273	201	203	239	257	265
Average Queue (ft)	81	112	60	59	180	149	66	81	106	137	150
95th Queue (ft)	155	172	105	133	258	236	160	149	185	223	234
Link Distance (ft)		1674			1184	1184	1184	448	448	448	448
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	300		300	400							
Storage Blk Time (%)							0				
Queuing Penalty (veh)							0				

Intersection: 3: Pine Hills Road & SR 408 WB ramps

Movement	WB	WB
Directions Served	L	R
Maximum Queue (ft)	91	129
Average Queue (ft)	30	59
95th Queue (ft)	63	95
Link Distance (ft)		1124
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	350	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Pine Hills Road & SR 408 EB Ramps

Movement	NB	NB	SB	SB
Directions Served	T	TR	L	T
Maximum Queue (ft)	4	32	110	4
Average Queue (ft)	0	3	43	0
95th Queue (ft)	2	16	74	3
Link Distance (ft)	1006	1006	225	225
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: SR 408 WB ramps & Old Winter Garden Road

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	T	T	T	L	R
Maximum Queue (ft)	195	165	232	206	346	59
Average Queue (ft)	80	38	107	81	182	25
95th Queue (ft)	152	100	191	173	286	53
Link Distance (ft)	946	946	1165	1165		1730
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					1000	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: John Young Parkway & SR 408 WB ramps

Movement	NB	NB	NB	NB	SB	SB	SB	SB	SB	NW	NW	NW
Directions Served	L	T	T	T	T	T	T	T	R	L	R	R
Maximum Queue (ft)	238	60	75	73	400	2280	2263	2248	173	158	158	147
Average Queue (ft)	109	1	2	2	399	2230	2188	1776	5	59	65	24
95th Queue (ft)	203	23	26	25	402	2404	2465	2863	72	119	119	79
Link Distance (ft)	323	323	323	323		2222	2222	2222			1371	
Upstream Blk Time (%)						92	24	2				
Queuing Penalty (veh)						0	0	0				
Storage Bay Dist (ft)					350				250	500		500
Storage Blk Time (%)					85	0		0	0			
Queuing Penalty (veh)					377	1		1	0			

Intersection: 7: John Young Parkway & SR 408 EB Ramps

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	T	T	T	R	L	T	T	T
Maximum Queue (ft)	166	189	122	486	466	356	217	363	131	163	180
Average Queue (ft)	55	103	37	320	274	190	9	350	28	63	75
95th Queue (ft)	138	169	77	435	407	327	77	363	84	121	144
Link Distance (ft)			1176	1113	1113	1113		323	323	323	323
Upstream Blk Time (%)								52			
Queuing Penalty (veh)								239			
Storage Bay Dist (ft)	450	450					250				
Storage Blk Time (%)							1				
Queuing Penalty (veh)							1				

Intersection: 28: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	65	49
Average Queue (ft)	2	1
95th Queue (ft)	24	17
Link Distance (ft)	115	115
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 620

Appendix B

Travel Demand Model Development

SR 408 from Florida's Turnpike (SR 91) to Colonial Drive (SR 50) Travel Demand Model Development

1.0 Introduction

This report documents the travel demand model development process for forecasting design traffic for the entire SR 408 corridor from the Florida's Turnpike (SR 91) to Colonial Drive (SR 50). The model was used as the basis for forecasting future traffic for the following Project Development and Environment (PD&E) studies – SR 408 Westbound from I-4 to Crystal Lake Drive and Semoran Boulevard to Goldenrod Road (Project # 408-175); and SR 408 from Kirkman Road to Church Street (Project # 408-174).

The version of the CFX travel demand model developed for the SR 414 Expressway Extension PD&E study, *CFX Model 414*, was used as a starting point for this effort. This model has a validation year of 2017 and forecast years of 2025 and 2045. The full model covers the nine counties in District 5 (Orange, Seminole, Osceola, Lake, Sumter, Marion, Volusia, Flagler, and Brevard Counties), as well as connected portions of Polk and Indian River Counties. This model was created with updates/revisions from previous studies and was originally based on the Central Florida Regional Planning Model (CFRPM) v6.1, produced by the Florida Department of Transportation (FDOT), District 5. The *CFX Model 414* was used to create a new version for the SR 408 PD&E studies and named *CFX Model 408*. Like its predecessor, the *CFX Model 408*, is a project-specific model of peak-season, average weekday traffic, with a disaggregated zone structure and supporting transportation network in the study area. The *CFX Model 408* study area is shown in **Figure 1.1**.

2.0 2017 Base Year Model Validation

The base year network and Traffic Analysis Zone (TAZ) structure originally developed for the *CFX Model SR 414* was used and compared with the newly released CFRPM v7. The CFRPM v7 zonal structure is more defined, having 7,112 zones compared to the ~5200 zones in the *CFX Model 414*. The zones along the SR 408 corridor were reviewed and updated based on the CFRPM v7 model zonal structure, with the disaggregation of only two zones. A map of the adjusted zones is shown in **Figure 2.1**. The zone splits were located in downtown Orlando, one on the west side of I-4 near Robinson Street and the other in Delaney Park just south of downtown. The other network updates in the downtown area were shifts in the centroid locations and loading links based on existing development, i.e., the Amway Center.

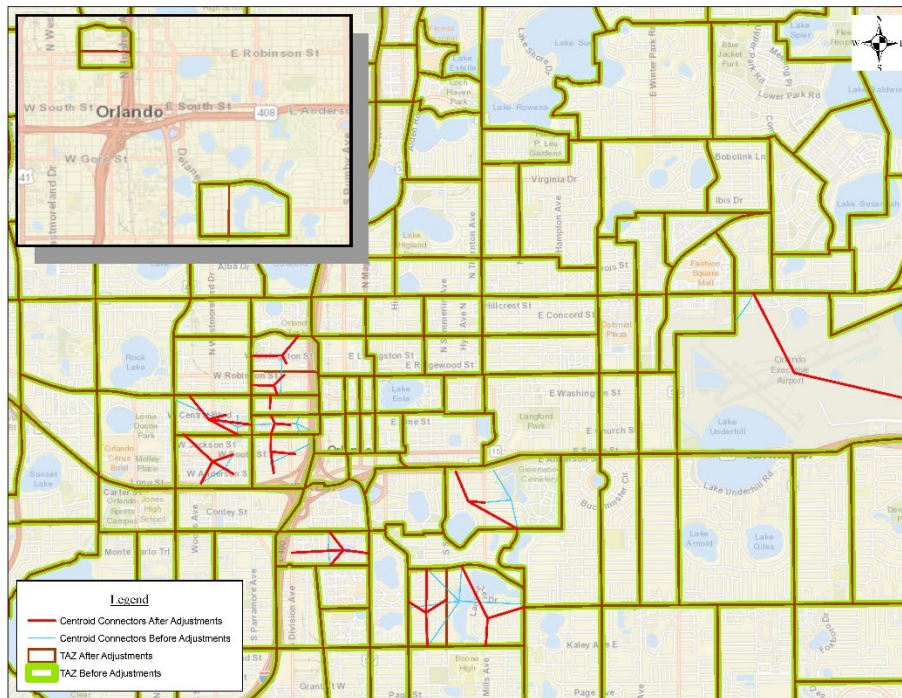
The 2017 socioeconomic (SE) data were updated for the disaggregated zones by dividing the original zonal data by area of the new zones. The SE data appeared to be reasonable compared to the existing land uses observed in the Google Earth aerial photography from December 2017. In addition, there were adjustments made to TAZ SE datasets to reflect zonal splits from a previous project, the Andes Avenue Extension Feasibility Study, where the SE data sets were not carried forward. These updates were concentrated near the SR 408 and SR 417 interchange area, where larger zones were disaggregated but the SE data was inconsistent. Overall, the network and zonal adjustments were completed to improve trip distribution in these developed areas and ensure better loading of traffic to the network and SR 408.

Using GIS and 2017 aerial imagery, the network facility types, number of lanes on roadway segments and intersection approaches, speeds and capacities on facilities that parallel and feed SR 408 were checked, to ensure that the network was properly coded to match existing conditions.

Figure 1.1
Project-Specific Model Study Area



Figure 2.1
Base Year Zonal Structure Adjustments



Model link volumes were compared to observed counts. The comparison revealed that there were several instances where the observed counts from the Florida Traffic Online database were mis-coded in the model network, specifically on sections of I-4 and on the parallel facilities of South and Anderson Streets. The observed data were corrected where applicable. Further, several adjustments were made to the link attributes on I-4 and SR 408 including operating speed and capacity. For I-4, the section between SR 408 and Robinson Street, SR 50 and Princeton Street, and between Fairbanks Avenue and Maitland Boulevard were adjusted so that the posted speed was uniform throughout the corridor. The posted speeds in the *CFX Model 408* were increased by multiplying by a factor and used as the free-flow speeds in the assignment module. To ensure the posted speed on SR 408 was represented correctly, speed decrease adjustments of 10 percent were implemented on sections of SR 408 from John Young Parkway to I-4 and from Mills Avenue to Crystal Lake Drive, and speed increase adjustments of 10 percent on the section from Dean Road to Challenger Parkway.

2.1 2017 Base Year Model Validation Results

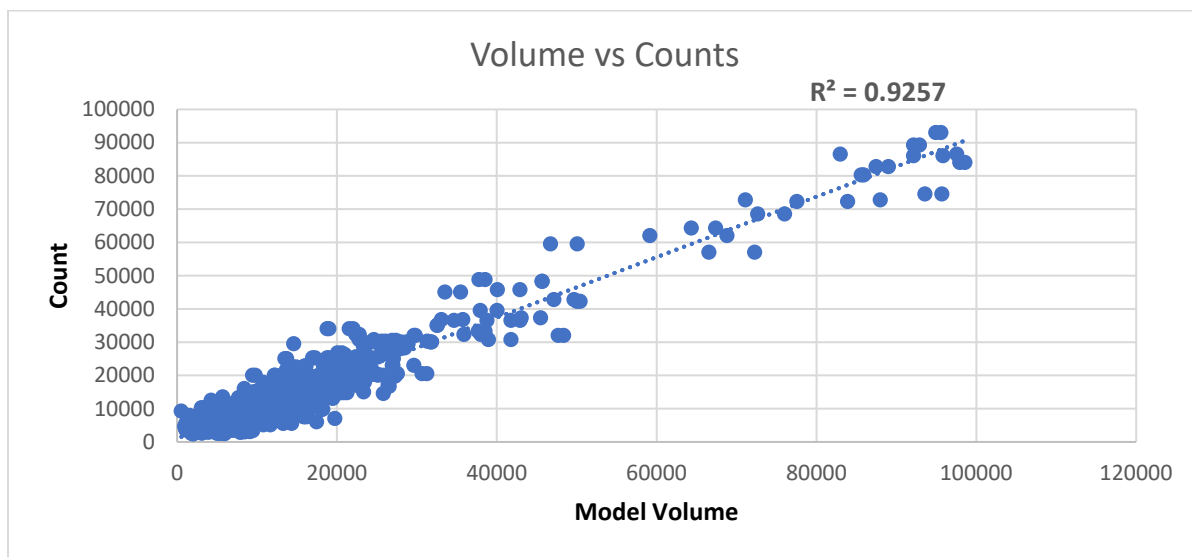
The final volume to count ratios by facility type are shown in **Table 2.1**. The overall volume to count ratio by facility type is 1.03 for the study area, with a deviation of 3.0 percent. Most of the facility type groups' deviations are within the acceptable range.

Table 2.1
2017 Base Year Model Volume to Count Ratio by Facility Type

Facility Type	Volume to Count Ratio	Deviation	Benchmarks	
			Preferable	Acceptable
Freeways	1.06	6%	+/- 6%	+/- 7%
Divided Arterials	0.95	-5%	+/- 10%	+/- 15%
Undivided Arterials	1.17	17%	+/- 10%	+/- 15%
Collectors	1.17	17%	+/- 20%	+/- 25%
One-Way Facilities	1.39	39%	+/- 20%	+/- 25%
Study Area	1.03	3%	+/- 15%	+/- 25%

The variance between base year model volumes and counts was calculated at a R-squared value of 0.9257, which is a close fit. The base year model scatter plot is shown on **Figure 2.2**.

Figure 2.2
2017 Base Year Model R² Scatter Plot



Percent Root Mean Squared Error (%RMSE) was calculated. It is a standard model validation check that measures the average error between the model-estimated volumes and the actual traffic counts. The lower the value, the less the error between the model-estimated volumes and the counts. The %RMSE stratified by volume groups is shown in **Table 2.2**. The overall %RSME of 32 percent is better than the target of 35-45 percent. Most of the volume groups fall within the acceptable %RSME range, with some of groups performing better than the acceptable range.

Table 2.2
2017 Base Year Model %RMSE by Volume Group

Volume Group	Number of Links	Model Volume	Count	RMSE	%RMSE	Acceptable Range
<=5,000	95	322,698	460,400	2,659	54.9%	45%-100%
5,000-9,999 VPD	177	1,329,729	1,229,500	3,295	47.4%	35% - 45%
10,000-14,999 VPD	131	1,713,735	1,767,950	4,443	32.9%	27% - 35%
15,000-19,999 VPD	106	1,825,054	1,714,400	5,200	32.2%	25% - 30%
20,000-29,999 VPD	111	2,650,665	2,584,450	5,141	22.1%	15% - 27%
30,000-49,999 VPD	36	1,406,214	1,351,250	10,524	28.0%	15% -25%
50,000+ VPD	31	2,496,770	2,290,000	12,499	16.9%	10%-20%
Study Area	687	11,744,865	11,397,950	5369.70	32%	35% - 45%

3.0 2025 Opening and 2045 Horizon Year Models

The opening and horizon model traffic forecast years were 2025 and 2045, respectively. The 2025 and 2045 future year models retained all the updates and enhancements from the 2017 base year model with additional adjustments to SE data (for zone disaggregation) and highway network to reflect future improvements in the study area.

3.1 Socioeconomic Forecasts

Independent socioeconomic forecasts of population, employment and school enrollment were developed by PFM (formerly Fishkind and Associates) for the entirety of Orange, Osceola and Lake Counties for various CFX expansion projects which were incorporated into this project model. PFM produced the forecasts at three levels (low, medium and high), consistent with the Bureau of Economic and Business Research (BEBR). **Tables 3.1** and **3.2** contains a summary of the medium SE data forecasts for the two counties relevant to the SR 408 corridor (Orange and Seminole) and the entire model. The long-term compound annual average growth rate in population, from 2017 to 2045, is 1.48% in Orange County, 0.83% in Seminole County and 1.49% for the entire model. The forecasted growth rate in employment is 1.61% in Orange County, 1.49% in Seminole County and 1.71% for the entire model.

Table 3.1
Population (1,000) Forecasts by County

County	2017	2025	Growth Rate (2017-2025)	2045	Growth Rate (2025-2045)	Growth Rate (2017-2045)
Orange	1,607.7	1,901.6	2.12%	2,423.1	1.22%	1.48%
Seminole	463.1	497.8	0.91%	584.1	0.80%	0.83%
Model Total	5,499.4	6,389.0	1.89%	8,313.6	1.33%	1.49%

Table 3.2
Employment (1,000) Forecasts by County

County	2017	2025	Growth Rate (2017-2025)	2045	Growth Rate (2025-2045)	Growth Rate (2017-2045)
Orange	924.0	1,130.8	2.56%	1,444.5	1.23%	1.61%
Seminole	261.7	300.3	1.74%	396.1	1.39%	1.49%
Model Total	2,456.3	2,935.4	2.25%	3,947.6	1.49%	1.71%

The only changes in the SE data forecasts for this project-specific model were for the disaggregated TAZ mentioned earlier. The SE data in the disaggregated zones were divided based on the percentage of land in each of the new zones as a proportion of the larger zone and evaluated and updated based on existing development and vacant developable land in the new zones. The analysis indicated that the area immediately adjacent to SR 408 is expected to have minimal changes, since it is already mostly built out. Most of the traffic growth is from outlying areas coming into downtown or passing through the area.

3.2 Future Year Highway Networks

The network changes in the base year network were carried over to the future year networks for consistency. The 2025 and 2045 future year highway networks in the study area were also reviewed for area and facility types, speeds, number of lanes and capacities, specifically the CFX facilities.

For the most part, the future year networks from the *CFX Model 414* were used in the *CFX Model 408*. The networks had been updated to incorporate link attributes revisions completed in the base year model and additional updates made to reflect planned improvements in the study area.

The future year networks in the model contain the transportation improvements identified in the CFX, FDOT and county work programs, as well as the improvements included in the cost feasible plan from Metroplan Orlando's Long-Range Transportation Plan for year 2040. **Table 3.3** contains a listing of the improvements in the 2025 and 2045 networks.

3.3 Tolls

CFX is the operator and developer of several toll roads in the Central Florida region, including SR 408. The "Customer First" toll policy was used for the inflation of toll rate inputs for 2025 and 2045. Passenger Car (2-axle toll rates) were used for all toll locations in the model inputs.

An annual inflation rate of 2.5 percent was assumed. The Value of Time (VOT) from model validation was established to be \$16.67 per hour in the validation year. This is consistent with prior models. The models use a parameter known as the Coefficient of Toll (CTOLL) which is the inverse of the VOT. The product of CTOLL and the toll amount is the time penalty from the toll facilities. **Table 3.4** contains the values of VOT and CTOLL used in the base year and future year models.

Table 3.3
Network Improvements (2025 and 2045)

Facility	From	To	Improvement	Model Year
I-4 Ultimate	Kirkman Road	SR 434	6-lanes + 4 Express Lanes	2025
SR 408	Clark Road	Hiawasse Road	Widen to 6-lanes	2025
SR 423/John Young Parkway	SR 50	N of Shrader Road	Widen to 6-lanes	2025
SR 429	Seidel Road	SR 414	Widen to 6-lanes	2025
SR 434/Forest City Road	SR 414	Kennedy Blvd	Widen to 6-lanes	2025
SR 438/Plant St/W Franklin Rd	SR 429	Ocoee Apopka Road	Widen to 4-lanes	2025
SR 50/West Colonial Blvd	SR 429	Good Homes Road	Widen to 6-Lanes	2025
SR 528/Beachline Exp	I-4	Boggy Creek Road	Widen to 8-Lanes	2025
Wekiva Parkway/SR 429	US 441	Mt Plymouth Road	New 4-Lane Expressway	2025
Wekiva Parkway/SR 429	Mt Plymouth Road	I-4	New 4-Lane Expressway	2025
Wekiva Parkway/SR 453	Wekiva Parkway/SR 429	SR 46	New 6-Lane Expressway	2025
SR 417/CF Greenway	International Drive	SR 528	Widen to 6-Lanes + PTSU Lane	2025
SR 429/Western Beltway	CR 535/Daniels Road	SR 414/Apopka Exp	Widen to 6-Lanes + PTSU Lane	2025
Florida's Turnpike	SR 50/Clermont	N. Hancock Road	Widen to 8-Lanes	2025
Good Homes Road	SR 408	SR 50	Widen to 4-lanes	2045
I-4 Beyond the Ultimate North	SR 434	Wekiva Parkway/SR 429	6-lanes + 4 Express Lanes	2045
SR 429/Western Beltway	I-4	CR 535/Daniels Road	Widen to 6-Lanes	2045
Florida's Turnpike	N. Hancock Road	US 27	Widen to 8-Lanes	2045
SR 528/Beachline Exp	Boggy Creek Rd	Innovation Way	Widen to 8-Lanes	2045
SR 528/Beachline Exp	Innovation Way	SR 520	Widen to 6-Lanes	2045

Table 3.4
VOT and CTOLL

	2017	2025	2045
VOT	\$16.67	\$20.31	\$33.27
CTOLL	0.060	0.049	0.030

Appendix C

Future Conditions Analysis

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4860	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1305
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.59
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4860	520
Peak Hour Factor (PHF)	0.95	0.95
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	5220	559
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.66	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)	0.247
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1566
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	57.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.148	Outer Lanes Freeway Speed (SO), mi/h	58.1
Flow in Lanes 1 and 2 (v12), pc/h	2088	Ramp Junction Speed (S), mi/h	57.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	2647	Average Density (D), pc/mi/ln	25.1
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	16.5

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5380	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1156
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.52
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1300
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5380	430
Peak Hour Factor (PHF)	0.95	0.95
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	5779	462
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.57	0.23

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)	0.245
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1318
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	57.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.160	Outer Lanes Freeway Speed (SO), mi/h	59.0
Flow in Lanes 1 and 2 (v12), pc/h	1757	Ramp Junction Speed (S), mi/h	58.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	2219	Average Density (D), pc/mi/ln	21.5
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	14.5

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5810	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1248
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.56
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5810	250
Peak Hour Factor (PHF)	0.95	0.95
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	6241	269
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.59	0.13

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)	0.304
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1423
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	55.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.184	Outer Lanes Freeway Speed (SO), mi/h	58.6
Flow in Lanes 1 and 2 (v12), pc/h	1897	Ramp Junction Speed (S), mi/h	57.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	2166	Average Density (D), pc/mi/ln	22.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	18.6

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6060	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1302
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.59
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	2
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided Two-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6060	450
Peak Hour Factor (PHF)	0.95	0.95
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	6509	483
Capacity (c), pc/h	10960	4003
Volume-to-Capacity Ratio (v/c)	0.59	0.12

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)	0.369
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1660
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.260	Outer Lanes Freeway Speed (SO), mi/h	65.3
Flow in Lanes 1 and 2 (v12), pc/h	2213	Ramp Junction Speed (S), mi/h	60.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	21.5
Level of Service (LOS)	A	Density in Ramp Influence Area (DR), pc/mi/ln	9.8

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5610	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1506
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.68
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.6
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	24.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Downstream John Young Parkway on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5610	500
Peak Hour Factor (PHF)	0.95	0.95
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	6026	537
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.75	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)	0.267
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1808
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	56.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.151	Outer Lanes Freeway Speed (SO), mi/h	57.2
Flow in Lanes 1 and 2 (v12), pc/h	2410	Ramp Junction Speed (S), mi/h	56.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	2947	Average Density (D), pc/mi/ln	28.8
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	18.9

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Upstream John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4670	550
Peak Hour Factor (PHF)	0.95	0.95
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	5016	591
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.46	0.30

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)	0.378
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1106
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	67.5
Flow in Lanes 1 and 2 (v12), pc/h	2302	Ramp Junction Speed (S), mi/h	60.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	16.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	10.5

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4120	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1106
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.50
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4120	320
Peak Hour Factor (PHF)	0.95	0.95
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	4425	344
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.54	0.17

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)	0.225
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1328
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	57.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.175	Outer Lanes Freeway Speed (SO), mi/h	58.9
Flow in Lanes 1 and 2 (v12), pc/h	1770	Ramp Junction Speed (S), mi/h	58.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	2114	Average Density (D), pc/mi/ln	20.5
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	12.5

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, In	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4440	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	954
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.43
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	310
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4440	430
Peak Hour Factor (PHF)	0.95	0.95
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	4769	462
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.44	0.23

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)	0.367
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1080
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	67.6
Flow in Lanes 1 and 2 (v12), pc/h	2132	Ramp Junction Speed (S), mi/h	60.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	15.8
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	19.8

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4010	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	861
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.39
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	13.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1380
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4010	360
Peak Hour Factor (PHF)	0.95	0.95
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	4307	387
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.39	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)	0.360
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	984
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	67.9
Flow in Lanes 1 and 2 (v12), pc/h	1908	Ramp Junction Speed (S), mi/h	60.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	14.2
Level of Service (LOS)	A	Density in Ramp Influence Area (DR), pc/mi/ln	8.2

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3650	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	784
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.35
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	12.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	2
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided Two-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	3650	450
Peak Hour Factor (PHF)	0.95	0.95
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	3921	483
Capacity (c), pc/h	10960	4003
Volume-to-Capacity Ratio (v/c)	0.36	0.12

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)	0.369
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1177
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.260	Outer Lanes Freeway Speed (SO), mi/h	67.2
Flow in Lanes 1 and 2 (v12), pc/h	1568	Ramp Junction Speed (S), mi/h	61.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	12.8
Level of Service (LOS)	A	Density in Ramp Influence Area (DR), pc/mi/ln	4.2

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3200	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	859
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.39
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	13.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3930	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1055
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.48
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	3930	510
Peak Hour Factor (PHF)	0.95	0.95
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	4221	548
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.54	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)	0.229
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1267
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	57.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.149	Outer Lanes Freeway Speed (SO), mi/h	59.1
Flow in Lanes 1 and 2 (v12), pc/h	1688	Ramp Junction Speed (S), mi/h	58.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	2236	Average Density (D), pc/mi/ln	20.5
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	13.3

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4440	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	954
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.43
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1300
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4440	360
Peak Hour Factor (PHF)	0.95	0.95
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	4769	387
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.47	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)	0.235
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1116
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	57.2
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.169	Outer Lanes Freeway Speed (SO), mi/h	59.7
Flow in Lanes 1 and 2 (v12), pc/h	1488	Ramp Junction Speed (S), mi/h	58.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	1875	Average Density (D), pc/mi/ln	17.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	11.8

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4800	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1031
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.47
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4800	430
Peak Hour Factor (PHF)	0.95	0.95
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	5156	462
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.51	0.23

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)	0.300
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1206
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	55.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.160	Outer Lanes Freeway Speed (SO), mi/h	59.4
Flow in Lanes 1 and 2 (v12), pc/h	1609	Ramp Junction Speed (S), mi/h	57.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	2071	Average Density (D), pc/mi/ln	19.5
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.7

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5230	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1124
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.51
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	2
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided Two-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5230	290
Peak Hour Factor (PHF)	0.95	0.95
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	5618	311
Capacity (c), pc/h	10960	4003
Volume-to-Capacity Ratio (v/c)	0.51	0.08

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)	0.353
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1433
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.260	Outer Lanes Freeway Speed (SO), mi/h	66.2
Flow in Lanes 1 and 2 (v12), pc/h	1910	Ramp Junction Speed (S), mi/h	61.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	18.4
Level of Service (LOS)	A	Density in Ramp Influence Area (DR), pc/mi/ln	7.2

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4940	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1326
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.60
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Downstream John Young Parkway on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4940	730
Peak Hour Factor (PHF)	0.95	0.95
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	5306	784
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.69	0.39

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)	0.264
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1592
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	56.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.120	Outer Lanes Freeway Speed (SO), mi/h	58.0
Flow in Lanes 1 and 2 (v12), pc/h	2122	Ramp Junction Speed (S), mi/h	57.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	2906	Average Density (D), pc/mi/ln	26.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	18.4

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Upstream John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5690	320
Peak Hour Factor (PHF)	0.95	0.95
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	6112	344
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.56	0.17

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)	0.356
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1368
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	66.5
Flow in Lanes 1 and 2 (v12), pc/h	2459	Ramp Junction Speed (S), mi/h	60.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	20.2
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	11.9

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5370	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1442
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.65
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	23.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5370	520
Peak Hour Factor (PHF)	0.95	0.95
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	5768	559
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.72	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)	0.261
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1731
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	56.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.148	Outer Lanes Freeway Speed (SO), mi/h	57.5
Flow in Lanes 1 and 2 (v12), pc/h	2307	Ramp Junction Speed (S), mi/h	57.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	2866	Average Density (D), pc/mi/ln	27.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	18.2

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, In	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5890	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1265
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.57
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	310
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5890	280
Peak Hour Factor (PHF)	0.95	0.95
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	6327	301
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.58	0.15

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)	0.352
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1431
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	66.2
Flow in Lanes 1 and 2 (v12), pc/h	2515	Ramp Junction Speed (S), mi/h	60.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	21.0
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	23.1

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5610	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1205
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.55
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	19.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1380
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5610	430
Peak Hour Factor (PHF)	0.95	0.95
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	6026	462
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.55	0.23

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)	0.367
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1314
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	66.7
Flow in Lanes 1 and 2 (v12), pc/h	2494	Ramp Junction Speed (S), mi/h	60.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	20.0
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	13.3

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5180	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1113
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.50
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	2
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided Two-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5180	570
Peak Hour Factor (PHF)	0.95	0.95
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	5564	612
Capacity (c), pc/h	10960	4003
Volume-to-Capacity Ratio (v/c)	0.51	0.15

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)	0.380
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1419
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.260	Outer Lanes Freeway Speed (SO), mi/h	66.3
Flow in Lanes 1 and 2 (v12), pc/h	1892	Ramp Junction Speed (S), mi/h	60.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	18.3
Level of Service (LOS)	A	Density in Ramp Influence Area (DR), pc/mi/ln	7.0

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4610	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1238
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.56
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4860	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1740
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.79
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	59.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	29.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4860	520
Peak Hour Factor (PHF)	0.95	0.95
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	5220	559
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.88	0.28

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)	0.366
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1984
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	54.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.620	Outer Lanes Freeway Speed (SO), mi/h	56.6
Flow in Lanes 1 and 2 (v12), pc/h	3236	Ramp Junction Speed (S), mi/h	55.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	3795	Average Density (D), pc/mi/ln	34.8
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	25.5

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5380	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1445
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.65
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	23.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1300
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5380	430
Peak Hour Factor (PHF)	0.95	0.95
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	5779	462
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.95	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)	0.425
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2231
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)	0.614	Outer Lanes Freeway Speed (SO), mi/h	55.7
Flow in Lanes 1 and 2 (v12), pc/h	3548	Ramp Junction Speed (S), mi/h	54.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	4010	Average Density (D), pc/mi/ln	38.4
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	28.5

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5810	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2080
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.94
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	52.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	39.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5810	250
Peak Hour Factor (PHF)	0.95	0.95
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	6241	269
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.99	0.13

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)	0.477
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2534
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	52.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.594	Outer Lanes Freeway Speed (SO), mi/h	54.0
Flow in Lanes 1 and 2 (v12), pc/h	3707	Ramp Junction Speed (S), mi/h	53.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	3976	Average Density (D), pc/mi/ln	40.9
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	32.7

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6060	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2170
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.98
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	50.3
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	43.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6060	450
Peak Hour Factor (PHF)	0.95	0.95
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	6509	483
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.99	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 (DS)	0.369
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2561
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.575	Outer Lanes Freeway Speed (SO), mi/h	61.8
Flow in Lanes 1 and 2 (v12), pc/h	3948	Ramp Junction Speed (S), mi/h	57.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	37.9
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	32.8

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5610	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2009
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.91
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	54.6
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	36.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Downstream John Young Parkway on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5610	500
Peak Hour Factor (PHF)	0.95	0.95
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	6026	537
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	1.00	0.27

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)	0.472
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2290
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	52.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.620	Outer Lanes Freeway Speed (SO), mi/h	55.5
Flow in Lanes 1 and 2 (v12), pc/h	3736	Ramp Junction Speed (S), mi/h	53.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	4273	Average Density (D), pc/mi/ln	40.9
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	29.2

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Upstream John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4670	550
Peak Hour Factor (PHF)	0.95	0.95
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	5016	591
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.57	0.30

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)	0.378
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1248
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	66.9
Flow in Lanes 1 and 2 (v12), pc/h	2520	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	20.9
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	12.4

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4120	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1475
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.7
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	23.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Weaving Report

Project Information

Analyst	CDM Smith	Date	3/29/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (Ls), ft	1900	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.10	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	3690	320	0	430
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	2.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.980	0.980	0.980
Flow Rate (vi), pc/h	3963	344	0	462
Weaving Flow Rate (vw), pc/h	806	Freeway Max Capacity (ciFL), pc/h/ln		2319
Non-Weaving Flow Rate (vNW), pc/h	3963	Density-Based Capacity (ciWL), pc/h/ln		2141
Total Flow Rate (v), pc/h	4769	Demand Flow-Based Capacity (ciW), pc/h		14201
Volume Ratio (VR)	0.169	Weaving Segment Capacity (cw), veh/h		8393
Minimum Lane Change Rate (LCMIN), lc/h	806	Adjusted Weaving Area Capacity, pc/h		8162
Maximum Weaving Length (LMAX), ft	4222	Volume-to-Capacity Ratio (v/c)		0.58

Speed and Density

Non-Weaving Vehicle Index (INW)	828	Average Weaving Speed (SW), mi/h	52.0
Non-Weaving Lane Change Rate (LCNW), lc/h	1076	Average Non-Weaving Speed (SNW), mi/h	50.4
Weaving Lane Change Rate (LCW), lc/h	1258	Average Speed (S), mi/h	50.7
Weaving Lane Change Rate (LCAII), lc/h	2334	Density (D), pc/mi/ln	23.5
Weaving Intensity Factor (W)	0.266	Level of Service (LOS)	C

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4010	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1436
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.65
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	23.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1380
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4010	360
Peak Hour Factor (PHF)	0.95	0.95
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	4307	387
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.65	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)	0.360
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1431
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.635	Outer Lanes Freeway Speed (SO), mi/h	66.2
Flow in Lanes 1 and 2 (v12), pc/h	2876	Ramp Junction Speed (S), mi/h	58.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	24.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	16.6

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3650	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	980
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.44
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	3650	450
Peak Hour Factor (PHF)	0.95	0.95
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	3921	483
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.45	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 (DS)	0.369
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	970
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	67.9
Flow in Lanes 1 and 2 (v12), pc/h	1982	Ramp Junction Speed (S), mi/h	60.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	16.2
Level of Service (LOS)	A	Density in Ramp Influence Area (DR), pc/mi/ln	7.8

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, In	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3200	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1146
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.52
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	3930	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1407
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.64
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	3930	510
Peak Hour Factor (PHF)	0.95	0.95
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	4221	548
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.73	0.27

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)	0.285
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1604
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	56.2
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.620	Outer Lanes Freeway Speed (SO), mi/h	57.9
Flow in Lanes 1 and 2 (v12), pc/h	2617	Ramp Junction Speed (S), mi/h	56.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	3165	Average Density (D), pc/mi/ln	28.0
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	20.6

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4440	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1192
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.54
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	19.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1300
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4440	360
Peak Hour Factor (PHF)	0.95	0.95
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	4769	387
Capacity (c), pc/h	6576	2001
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)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.317
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1841
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	55.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.614	Outer Lanes Freeway Speed (SO), mi/h	57.1
Flow in Lanes 1 and 2 (v12), pc/h	2928	Ramp Junction Speed (S), mi/h	56.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	3315	Average Density (D), pc/mi/ln	30.6
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	23.1

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4800	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1719
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.78
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	59.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	28.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4800	430
Peak Hour Factor (PHF)	0.95	0.95
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	5156	462
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.85	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)	0.402
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2093
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	53.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.594	Outer Lanes Freeway Speed (SO), mi/h	56.2
Flow in Lanes 1 and 2 (v12), pc/h	3063	Ramp Junction Speed (S), mi/h	54.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	3525	Average Density (D), pc/mi/ln	34.2
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	29.1

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, In	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5230	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1873
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.85
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	57.4
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	32.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5230	290
Peak Hour Factor (PHF)	0.95	0.95
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	5618	311
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.85	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)	0.353
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2096
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.605	Outer Lanes Freeway Speed (SO), mi/h	63.6
Flow in Lanes 1 and 2 (v12), pc/h	3522	Ramp Junction Speed (S), mi/h	57.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	32.3
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	29.1

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4940	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1769
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.80
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	59.1
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	29.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Downstream John Young Parkway on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	4940	730
Peak Hour Factor (PHF)	0.95	0.95
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	5306	784
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.93	0.39

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)	0.422
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2016
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)	0.620	Outer Lanes Freeway Speed (SO), mi/h	56.4
Flow in Lanes 1 and 2 (v12), pc/h	3290	Ramp Junction Speed (S), mi/h	54.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	4074	Average Density (D), pc/mi/ln	37.3
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	27.6

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Upstream John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5690	320
Peak Hour Factor (PHF)	0.95	0.95
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	6112	344
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.70	0.17

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)	0.356
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1627
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	65.5
Flow in Lanes 1 and 2 (v12), pc/h	2859	Ramp Junction Speed (S), mi/h	60.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	25.5
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.3

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5370	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1923
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.87
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	56.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	34.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Weaving Report

Project Information

Analyst	CDM Smith	Date	3/29/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (Ls), ft	1900	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.10	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	5090	520	0	280
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	2.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.980	0.980	0.980
Flow Rate (vi), pc/h	5467	559	0	301
Weaving Flow Rate (vw), pc/h	860	Freeway Max Capacity (ciFL), pc/h/ln		2319
Non-Weaving Flow Rate (vNW), pc/h	5467	Density-Based Capacity (ciWL), pc/h/ln		2167
Total Flow Rate (v), pc/h	6327	Demand Flow-Based Capacity (ciW), pc/h		17647
Volume Ratio (VR)	0.136	Weaving Segment Capacity (cw), veh/h		8495
Minimum Lane Change Rate (LCMIN), lc/h	860	Adjusted Weaving Area Capacity, pc/h		8261
Maximum Weaving Length (LMAX), ft	3892	Volume-to-Capacity Ratio (v/c)		0.77

Speed and Density

Non-Weaving Vehicle Index (INW)	1143	Average Weaving Speed (SW), mi/h	51.1
Non-Weaving Lane Change Rate (LCNW), lc/h	1386	Average Non-Weaving Speed (SNW), mi/h	48.1
Weaving Lane Change Rate (LCW), lc/h	1312	Average Speed (S), mi/h	48.5
Weaving Lane Change Rate (LCAII), lc/h	2698	Density (D), pc/mi/ln	32.6
Weaving Intensity Factor (W)	0.298	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5610	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2009
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.91
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	54.6
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	36.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1380
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5610	430
Peak Hour Factor (PHF)	0.95	0.95
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	6026	462
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.92	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 (DS)	0.367
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2292
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.588	Outer Lanes Freeway Speed (SO), mi/h	62.9
Flow in Lanes 1 and 2 (v12), pc/h	3734	Ramp Junction Speed (S), mi/h	57.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	34.9
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	23.9

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5180	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1391
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.63
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5180	570
Peak Hour Factor (PHF)	0.95	0.95
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	5564	612
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.63	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)	0.380
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1397
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	66.4
Flow in Lanes 1 and 2 (v12), pc/h	2771	Ramp Junction Speed (S), mi/h	59.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	23.3
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	14.6

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2025
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, In	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4610	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1651
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.75
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	60.6
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	27.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6530	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1754
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.79
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	59.3
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	29.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6530	660
Peak Hour Factor (PHF)	0.95	0.95
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	7014	709
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.88	0.35

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)	0.323
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2104
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	55.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.129	Outer Lanes Freeway Speed (SO), mi/h	56.1
Flow in Lanes 1 and 2 (v12), pc/h	2806	Ramp Junction Speed (S), mi/h	55.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	3515	Average Density (D), pc/mi/ln	34.6
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	23.2

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	7190	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1545
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.70
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.4
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	25.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1300
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7190	530
Peak Hour Factor (PHF)	0.95	0.95
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	7723	569
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.76	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)	0.272
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1656
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	56.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.147	Outer Lanes Freeway Speed (SO), mi/h	57.7
Flow in Lanes 1 and 2 (v12), pc/h	2209	Ramp Junction Speed (S), mi/h	57.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	2778	Average Density (D), pc/mi/ln	29.0
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	18.8

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	7720	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1658
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.75
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	60.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	27.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7720	300
Peak Hour Factor (PHF)	0.95	0.95
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	8292	322
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.79	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 (MS)	0.327
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1778
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	55.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.178	Outer Lanes Freeway Speed (SO), mi/h	57.3
Flow in Lanes 1 and 2 (v12), pc/h	2372	Ramp Junction Speed (S), mi/h	56.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	2694	Average Density (D), pc/mi/ln	30.5
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	22.7

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, In	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	8020	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1723
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.78
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	59.7
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	28.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	2
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided Two-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	8020	550
Peak Hour Factor (PHF)	0.95	0.95
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	8614	591
Capacity (c), pc/h	10960	4003
Volume-to-Capacity Ratio (v/c)	0.79	0.15

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)	0.378
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2068
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.260	Outer Lanes Freeway Speed (SO), mi/h	63.7
Flow in Lanes 1 and 2 (v12), pc/h	2756	Ramp Junction Speed (S), mi/h	59.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	28.9
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	14.5

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	7470	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2006
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.91
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	54.6
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	36.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Downstream John Young Parkway on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7470	600
Peak Hour Factor (PHF)	0.95	0.95
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	8024	644
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.99	0.32

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)	0.376
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2407
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	54.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.137	Outer Lanes Freeway Speed (SO), mi/h	54.7
Flow in Lanes 1 and 2 (v12), pc/h	3210	Ramp Junction Speed (S), mi/h	54.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	3854	Average Density (D), pc/mi/ln	39.7
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	25.9

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Upstream John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6450	670
Peak Hour Factor (PHF)	0.95	0.95
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	6928	720
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.63	0.36

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)	0.390
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1457
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	66.1
Flow in Lanes 1 and 2 (v12), pc/h	2974	Ramp Junction Speed (S), mi/h	59.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	23.3
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	16.3

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5780	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1552
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.70
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.4
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	25.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5780	390
Peak Hour Factor (PHF)	0.95	0.95
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	6208	419
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.76	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 (MS)	0.263
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1863
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	56.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.165	Outer Lanes Freeway Speed (SO), mi/h	57.0
Flow in Lanes 1 and 2 (v12), pc/h	2483	Ramp Junction Speed (S), mi/h	56.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	2902	Average Density (D), pc/mi/ln	29.1
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	18.6

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6170	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1325
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.60
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	310
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6170	520
Peak Hour Factor (PHF)	0.95	0.95
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	6627	559
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.60	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 (DS)	0.376
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1431
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	66.2
Flow in Lanes 1 and 2 (v12), pc/h	2771	Ramp Junction Speed (S), mi/h	59.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	22.2
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	25.3

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5650	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1214
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.55
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	19.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1380
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5650	460
Peak Hour Factor (PHF)	0.95	0.95
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	6069	494
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.55	0.25

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)	0.370
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1315
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	66.7
Flow in Lanes 1 and 2 (v12), pc/h	2528	Ramp Junction Speed (S), mi/h	60.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	20.2
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	13.6

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5190	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1115
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.50
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	2
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided Two-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5190	570
Peak Hour Factor (PHF)	0.95	0.95
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	5575	612
Capacity (c), pc/h	10960	4003
Volume-to-Capacity Ratio (v/c)	0.51	0.15

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)	0.380
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1421
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.260	Outer Lanes Freeway Speed (SO), mi/h	66.3
Flow in Lanes 1 and 2 (v12), pc/h	1896	Ramp Junction Speed (S), mi/h	60.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	18.3
Level of Service (LOS)	A	Density in Ramp Influence Area (DR), pc/mi/ln	7.1

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4620	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1240
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.56
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, In	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5280	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1418
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.64
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5280	640
Peak Hour Factor (PHF)	0.95	0.95
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	5671	687
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.73	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 (MS)	0.267
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1702
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	56.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.132	Outer Lanes Freeway Speed (SO), mi/h	57.6
Flow in Lanes 1 and 2 (v12), pc/h	2268	Ramp Junction Speed (S), mi/h	57.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	2955	Average Density (D), pc/mi/ln	27.8
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	18.9

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5920	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1272
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.58
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1300
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5920	460
Peak Hour Factor (PHF)	0.95	0.95
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	6359	494
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.63	0.25

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)	0.254
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1450
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	56.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.156	Outer Lanes Freeway Speed (SO), mi/h	58.5
Flow in Lanes 1 and 2 (v12), pc/h	1933	Ramp Junction Speed (S), mi/h	57.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	2427	Average Density (D), pc/mi/ln	23.8
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	16.1

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6380	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1371
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.62
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6380	520
Peak Hour Factor (PHF)	0.95	0.95
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	6853	559
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.68	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)	0.320
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1501
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	55.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.148	Outer Lanes Freeway Speed (SO), mi/h	58.3
Flow in Lanes 1 and 2 (v12), pc/h	2001	Ramp Junction Speed (S), mi/h	57.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	2560	Average Density (D), pc/mi/ln	26.0
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	21.5

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, In	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6900	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1482
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.7
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	24.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	2
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided Two-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6900	350
Peak Hour Factor (PHF)	0.95	0.95
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	7411	376
Capacity (c), pc/h	10960	4003
Volume-to-Capacity Ratio (v/c)	0.68	0.09

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)	0.359
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1778
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.260	Outer Lanes Freeway Speed (SO), mi/h	64.9
Flow in Lanes 1 and 2 (v12), pc/h	2372	Ramp Junction Speed (S), mi/h	60.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	24.5
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	11.2

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6550	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1759
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.80
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	59.3
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	29.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Downstream John Young Parkway on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6550	880
Peak Hour Factor (PHF)	0.95	0.95
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	7035	945
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.91	0.47

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)	0.360
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2111
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)	0.100	Outer Lanes Freeway Speed (SO), mi/h	56.1
Flow in Lanes 1 and 2 (v12), pc/h	2814	Ramp Junction Speed (S), mi/h	55.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	3759	Average Density (D), pc/mi/ln	36.0
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	25.0

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Upstream John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7490	380
Peak Hour Factor (PHF)	0.95	0.95
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	8045	408
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.73	0.20

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)	0.362
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1700
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	65.2
Flow in Lanes 1 and 2 (v12), pc/h	3036	Ramp Junction Speed (S), mi/h	59.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	26.9
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	16.9

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	7110	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1909
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.86
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	56.7
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	33.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7110	630
Peak Hour Factor (PHF)	0.95	0.95
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	7637	677
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.95	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 (MS)	0.355
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2291
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	54.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.133	Outer Lanes Freeway Speed (SO), mi/h	55.5
Flow in Lanes 1 and 2 (v12), pc/h	3055	Ramp Junction Speed (S), mi/h	55.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	3732	Average Density (D), pc/mi/ln	37.7
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	24.9

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	7740	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1663
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.75
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	60.4
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	27.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	310
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7740	340
Peak Hour Factor (PHF)	0.95	0.95
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	8314	365
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.76	0.18

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)	0.358
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1773
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	64.9
Flow in Lanes 1 and 2 (v12), pc/h	3106	Ramp Junction Speed (S), mi/h	59.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	27.8
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	28.2

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	7400	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1590
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.1
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	26.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1380
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7400	530
Peak Hour Factor (PHF)	0.95	0.95
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	7948	569
Capacity (c), pc/h	10960	2001
Volume-to-Capacity Ratio (v/c)	0.73	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 (DS)	0.377
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1633
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	65.4
Flow in Lanes 1 and 2 (v12), pc/h	3093	Ramp Junction Speed (S), mi/h	59.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	26.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	18.4

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	5	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6870	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1476
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.7
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	23.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	5	2
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided Two-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6870	710
Peak Hour Factor (PHF)	0.95	0.95
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	7379	763
Capacity (c), pc/h	10960	4003
Volume-to-Capacity Ratio (v/c)	0.67	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)	0.394
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1771
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)	0.260	Outer Lanes Freeway Speed (SO), mi/h	64.9
Flow in Lanes 1 and 2 (v12), pc/h	2361	Ramp Junction Speed (S), mi/h	60.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	24.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	11.1

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6160	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1654
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.75
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	60.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	27.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6530	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2338
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.06
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6530	660
Peak Hour Factor (PHF)	0.95	0.95
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	7014	709
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	1.17	0.35

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	2160.3	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	-
Downstream Equilibrium Distance (LEQ), ft	0.0	Flow Outer Lanes (vOA), pc/h/ln	2665
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.620	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	4349	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (vR12), pc/h	5058	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	-

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	7190	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1931
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.87
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	56.3
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	34.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1300
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7190	530
Peak Hour Factor (PHF)	0.95	0.95
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	7723	569
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	1.26	0.28

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	2193.2	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	-
Downstream Equilibrium Distance (LEQ), ft	0.0	Flow Outer Lanes (vOA), pc/h/ln	2700
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.614	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	5023	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (vR12), pc/h	5592	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	-

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	7720	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2764
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.25
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7720	300
Peak Hour Factor (PHF)	0.95	0.95
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	8292	322
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	1.31	0.16

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	1951.3	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	-
Downstream Equilibrium Distance (LEQ), ft	0.0	Flow Outer Lanes (vOA), pc/h/ln	2700
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.594	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	5592	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (vR12), pc/h	5914	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	-

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	8020	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2871
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.30
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	8020	550
Peak Hour Factor (PHF)	0.95	0.95
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	8614	591
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	1.31	0.30

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	0.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	-
Downstream Equilibrium Distance (LEQ), ft	0.0	Flow Outer Lanes (vOA), pc/h/ln	2700
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.517	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	5914	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (vR12), pc/h	5914	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	-

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	7470	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2675
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.21
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Downstream John Young Parkway on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7470	600
Peak Hour Factor (PHF)	0.95	0.95
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	8024	644
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	1.32	0.32

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	2362.5	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	-
Downstream Equilibrium Distance (LEQ), ft	0.0	Flow Outer Lanes (vOA), pc/h/ln	2700
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.620	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	5324	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (vR12), pc/h	5968	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	-

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Upstream John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6450	670
Peak Hour Factor (PHF)	0.95	0.95
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	6928	720
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.79	0.36

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)	0.390
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1751
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	65.0
Flow in Lanes 1 and 2 (v12), pc/h	3427	Ramp Junction Speed (S), mi/h	59.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	29.3
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	20.2

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5780	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2069
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.94
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	53.1
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	39.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Weaving Report

Project Information

Analyst	CDM Smith	Date	3/29/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (Ls), ft	1900	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.10	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	5260	390	0	520
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	2.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.980	0.980	0.980
Flow Rate (vi), pc/h	5650	419	0	559
Weaving Flow Rate (vw), pc/h	978	Freeway Max Capacity (ciFL), pc/h/ln		2319
Non-Weaving Flow Rate (vNW), pc/h	5650	Density-Based Capacity (ciWL), pc/h/ln		2157
Total Flow Rate (v), pc/h	6628	Demand Flow-Based Capacity (ciW), pc/h		16216
Volume Ratio (VR)	0.148	Weaving Segment Capacity (cw), veh/h		8455
Minimum Lane Change Rate (LCMIN), lc/h	978	Adjusted Weaving Area Capacity, pc/h		8222
Maximum Weaving Length (LMAX), ft	4011	Volume-to-Capacity Ratio (v/c)		0.81

Speed and Density

Non-Weaving Vehicle Index (INW)	1181	Average Weaving Speed (SW), mi/h	50.8
Non-Weaving Lane Change Rate (LCNW), lc/h	1423	Average Non-Weaving Speed (SNW), mi/h	46.9
Weaving Lane Change Rate (LCW), lc/h	1430	Average Speed (S), mi/h	47.4
Weaving Lane Change Rate (LCAII), lc/h	2853	Density (D), pc/mi/ln	35.0
Weaving Intensity Factor (W)	0.311	Level of Service (LOS)	D

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5650	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2023
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.92
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	54.2
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	37.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1380
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5650	460
Peak Hour Factor (PHF)	0.95	0.95
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	6069	494
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.92	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)	0.370
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2308
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.586	Outer Lanes Freeway Speed (SO), mi/h	62.8
Flow in Lanes 1 and 2 (v12), pc/h	3761	Ramp Junction Speed (S), mi/h	57.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	35.2
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	24.2

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5190	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1394
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.63
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future AM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5190	570
Peak Hour Factor (PHF)	0.95	0.95
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	5575	612
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.64	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)	0.380
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1400
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	66.3
Flow in Lanes 1 and 2 (v12), pc/h	2776	Ramp Junction Speed (S), mi/h	59.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	23.3
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	14.6

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future AM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	4620	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1654
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.75
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	60.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	27.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5280	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1890
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.86
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	57.1
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	33.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5280	640
Peak Hour Factor (PHF)	0.95	0.95
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	5671	687
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	0.97	0.34

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)	0.453
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2155
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)	0.620	Outer Lanes Freeway Speed (SO), mi/h	55.9
Flow in Lanes 1 and 2 (v12), pc/h	3516	Ramp Junction Speed (S), mi/h	53.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	4203	Average Density (D), pc/mi/ln	39.3
Level of Service (LOS)	D	Density in Ramp Influence Area (DR), pc/mi/ln	28.6

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road on-ramp and Pine Hills Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	5920	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1590
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.72
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	61.1
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	26.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	C
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1300
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	5920	460
Peak Hour Factor (PHF)	0.95	0.95
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	6359	494
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	1.04	0.25

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	1885.3	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	-
Downstream Equilibrium Distance (LEQ), ft	0.0	Flow Outer Lanes (vOA), pc/h/ln	2455
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.614	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	3904	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (vR12), pc/h	4398	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	-

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills Road on-ramp and Old Winter Garden Road on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6380	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2284
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.03
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6380	520
Peak Hour Factor (PHF)	0.95	0.95
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	6853	559
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	1.13	0.28

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	1694.1	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	-
Downstream Equilibrium Distance (LEQ), ft	0.0	Flow Outer Lanes (vOA), pc/h/ln	2700
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.594	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	4153	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (vR12), pc/h	4712	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	-

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, In	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6900	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2470
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.12
Passenger Car Equivalent (ET)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road on-ramp and John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	600
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6900	350
Peak Hour Factor (PHF)	0.95	0.95
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	7411	376
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	1.13	0.19

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	0.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	-
Downstream Equilibrium Distance (LEQ), ft	0.0	Flow Outer Lanes (vOA), pc/h/ln	2700
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.557	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	4711	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (vR12), pc/h	4711	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	-

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6550	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2345
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.06
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Merge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Downstream John Young Parkway on-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6550	880
Peak Hour Factor (PHF)	0.95	0.95
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	7035	945
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	1.21	0.47

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	2215.3	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	-
Downstream Equilibrium Distance (LEQ), ft	0.0	Flow Outer Lanes (vOA), pc/h/ln	2673
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.620	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	4362	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (vR12), pc/h	5307	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	-

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Upstream John Young Parkway off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7490	380
Peak Hour Factor (PHF)	0.95	0.95
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	8045	408
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.92	0.20

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)	0.362
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	2154
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.436	Outer Lanes Freeway Speed (SO), mi/h	63.4
Flow in Lanes 1 and 2 (v12), pc/h	3738	Ramp Junction Speed (S), mi/h	59.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	34.1
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	22.9

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between John Young Parkway off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	7110	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2546
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.15
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Weaving Report

Project Information

Analyst	CDM Smith	Date	3/29/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Between John Young Parkway on-ramp and Old Winter Garden off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (Ls), ft	1900	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.10	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	6770	630	0	340
Peak Hour Factor (PHF)	0.95	0.95	0.95	0.95
Total Trucks, %	2.00	2.00	2.00	2.00
Heavy Vehicle Adjustment Factor (fHV)	0.980	0.980	0.980	0.980
Flow Rate (vi), pc/h	7272	677	0	365
Weaving Flow Rate (vw), pc/h	1042	Freeway Max Capacity (ciFL), pc/h/ln		2319
Non-Weaving Flow Rate (vNW), pc/h	7272	Density-Based Capacity (ciWL), pc/h/ln		2175
Total Flow Rate (v), pc/h	8314	Demand Flow-Based Capacity (ciW), pc/h		19200
Volume Ratio (VR)	0.125	Weaving Segment Capacity (cw), veh/h		8526
Minimum Lane Change Rate (LCMIN), lc/h	0	Adjusted Weaving Area Capacity, pc/h		8291
Maximum Weaving Length (LMAX), ft	3784	Volume-to-Capacity Ratio (v/c)		1.00

Speed and Density

Non-Weaving Vehicle Index (INW)	-	Average Weaving Speed (SW), mi/h	-
Non-Weaving Lane Change Rate (LCNW), lc/h	-	Average Non-Weaving Speed (SNW), mi/h	-
Weaving Lane Change Rate (LCW), lc/h	-	Average Speed (S), mi/h	-
Weaving Lane Change Rate (LCAII), lc/h	-	Density (D), pc/mi/ln	-
Weaving Intensity Factor (W)	-	Level of Service (LOS)	F

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	7400	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2649
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.20
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	-
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	-
Total Ramp Density Adjustment	-	Level of Service (LOS)	F
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Old Winter Garden Road off-ramp and Pine Hills off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1380
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	7400	530
Peak Hour Factor (PHF)	0.95	0.95
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	7948	569
Capacity (c), pc/h	6576	2001
Volume-to-Capacity Ratio (v/c)	1.21	0.28

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	0.0	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	-
Downstream Equilibrium Distance (LEQ), ft	0.0	Flow Outer Lanes (VOA), pc/h/ln	2700
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	-
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	0.535	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	5248	Ramp Junction Speed (S), mi/h	-
Flow Entering Ramp-Infl. Area (vR12), pc/h	5248	Average Density (D), pc/mi/ln	-
Level of Service (LOS)	F	Density in Ramp Influence Area (DR), pc/mi/ln	-

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	6870	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1845
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.83
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	57.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	31.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

HCS7 Freeway Diverge Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange	Time Analyzed	Future PM Peak
Project Description	Between Pine Hills off-ramp and Kirkman Road off-ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	4	1
Free-Flow Speed (FFS), mi/h	65.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.953	0.953
Final Capacity Adjustment Factor (CAF)	0.953	0.953
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	6870	710
Peak Hour Factor (PHF)	0.95	0.95
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	7379	763
Capacity (c), pc/h	8768	2001
Volume-to-Capacity Ratio (v/c)	0.84	0.38

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)	0.394
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	1866
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	64.5
Flow in Lanes 1 and 2 (v12), pc/h	3648	Ramp Junction Speed (S), mi/h	58.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	31.3
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	22.1

HCS7 Basic Freeway Report

Project Information

Analyst	CDM Smith	Date	1/10/2023
Agency	CDM Smith	Analysis Year	2045
Jurisdiction	Orange County	Time Analyzed	Future PM Peak
Project Description	Between Kirkman Road off-ramp and on-ramp	Units	U.S. Customary

Geometric Data

Number of Lanes, ln	3	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	65.0
Right-Side Lateral Clearance, ft	-		

Adjustment Factors

Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.953
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.953
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity
























Demand Volume veh/h	6160	Heavy Vehicle Adjustment Factor (fhv)	0.980
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2206
Total Trucks, %	2.00	Capacity (c), pc/h/ln	2319
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2210
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	1.00
Passenger Car Equivalent (Et)	2.00		

Speed and Density

Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	49.2
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	44.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	61.9		

Lanes, Volumes, Timings
1: Kirkman Road & SR 408 WB ramps

2025 AM_No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				 				  			  	
Traffic Volume (vph)	0	0	0	320	0	130	170	930	0	0	740	190
Future Volume (vph)	0	0	0	320	0	130	170	930	0	0	740	190
Satd. Flow (prot)	0	0	0	3433	0	1583	1770	5085	0	0	5085	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	1770	5085	0	0	5085	1583
Satd. Flow (RTOR)						137						200
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	0	0	337	0	137	179	979	0	0	779	200
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	337	0	137	179	979	0	0	779	200
Turn Type				Prot		Perm	Prot	NA			NA	Perm
Protected Phases				4			1	6			2	
Permitted Phases						4						2
Total Split (s)				47.0		47.0	49.0	95.0			74.0	74.0
Total Lost Time (s)				7.0		7.0	7.9	6.9			7.0	7.0
Act Effct Green (s)				24.1		24.1	31.0	114.1			93.0	93.0
Actuated g/C Ratio				0.14		0.14	0.18	0.67			0.55	0.55
v/c Ratio				0.69		0.40	0.56	0.29			0.28	0.21
Control Delay				76.8		12.1	67.6	11.2			21.8	3.2
Queue Delay				0.0		0.0	0.0	0.2			0.0	0.0
Total Delay				76.8		12.1	67.6	11.4			21.8	3.2
LOS				E		B	E	B			C	A
Approach Delay					58.1			20.1			18.0	
Approach LOS					E			C			B	
Queue Length 50th (ft)				187		0	195	171			165	0
Queue Length 95th (ft)				234		64	286	293			223	45
Internal Link Dist (ft)		526			1048			446			818	
Turn Bay Length (ft)				400		400						300
Base Capacity (vph)				807		477	427	3413			2782	957
Starvation Cap Reductn				0		0	0	1417			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.42		0.29	0.42	0.49			0.28	0.21
Intersection Summary												
Cycle Length: 170												
Actuated Cycle Length: 170												
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.76												
Intersection Signal Delay: 26.2												
Intersection LOS: C												

Lane Group	Ø5	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	8
Permitted Phases		
Total Split (s)	28.0	47.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings 1: Kirkman Road & SR 408 WB ramps

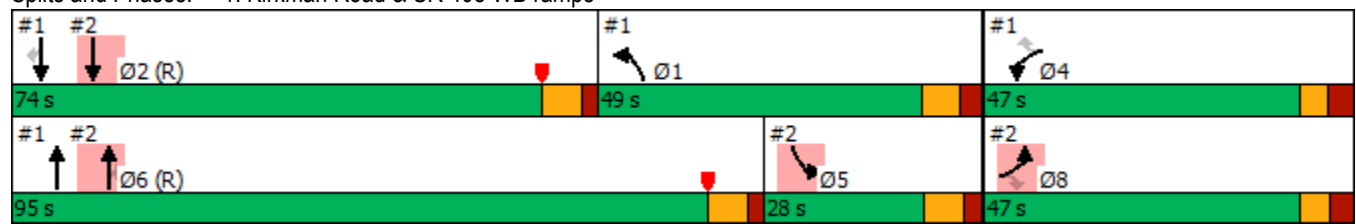
2025 AM_No Build

Intersection Capacity Utilization 60.7%

ICU Level of Service B

























Analysis Period (min) 15

Splits and Phases: 1: Kirkman Road & SR 408 WB ramps



Lanes, Volumes, Timings
2: Kirkman Road & SR 408 EB Ramps

2025 AM_No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			   	
Traffic Volume (vph)	350	0	210	0	0	0	0	750	460	60	1000	0
Future Volume (vph)	350	0	210	0	0	0	0	750	460	60	1000	0
Satd. Flow (prot)	3433	0	1583	0	0	0	0	6408	1583	1770	5085	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	3433	0	1583	0	0	0	0	6408	1583	1770	5085	0
Satd. Flow (RTOR)			221						484			
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	368	0	221	0	0	0	0	789	484	63	1053	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	368	0	221	0	0	0	0	789	484	63	1053	0
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	8							6		5	2	
Permitted Phases			8						6			
Total Split (s)	47.0		47.0					95.0	95.0	28.0	74.0	
Total Lost Time (s)	7.2		7.2					6.9	6.9	7.6	7.0	
Act Effct Green (s)	23.9		23.9					114.1	114.1	10.3	93.0	
Actuated g/C Ratio	0.14		0.14					0.67	0.67	0.06	0.55	
v/c Ratio	0.76		0.54					0.18	0.40	0.59	0.38	
Control Delay	80.7		11.9					11.2	2.0	107.9	11.3	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.2	
Total Delay	80.7		11.9					11.2	2.0	107.9	11.5	
LOS	F		B					B	A	F	B	
Approach Delay		54.9						7.7			16.9	
Approach LOS		D						A			B	
Queue Length 50th (ft)	207		0					90	0	73	160	
Queue Length 95th (ft)	256		81					127	46	127	178	
Internal Link Dist (ft)		1655			142			1141			446	
Turn Bay Length (ft)	300		300						250			
Base Capacity (vph)	803		539					4301	1221	212	2782	
Starvation Cap Reductn	0		0					0	0	0	753	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.46		0.41					0.18	0.40	0.30	0.52	
Intersection Summary												
Cycle Length: 170												
Actuated Cycle Length: 170												
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.76												
Intersection Signal Delay: 20.5												
Intersection LOS: C												

Lane Group	Ø1	Ø4
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	1	4
Permitted Phases		
Total Split (s)	49.0	47.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings 2: Kirkman Road & SR 408 EB Ramps

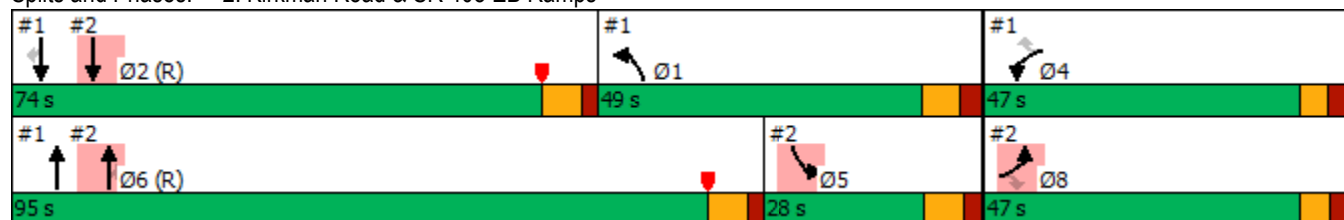
2025 AM_No Build

Intersection Capacity Utilization 60.7%

ICU Level of Service B











Analysis Period (min) 15

Splits and Phases: 2: Kirkman Road & SR 408 EB Ramps









Lanes, Volumes, Timings
3: Pine Hills Road & SR 408 WB ramps

2025 AM_No Build

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	50	310	460	0	0	910
Future Volume (vph)	50	310	460	0	0	910
Satd. Flow (prot)	1787	1599	3574	0	0	3574
Flt Permitted	0.950					
Satd. Flow (perm)	1787	1599	3574	0	0	3574
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	53	326	484	0	0	958
Shared Lane Traffic (%)						
Lane Group Flow (vph)	53	326	484	0	0	958
Sign Control	Stop		Free			Free
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 39.9%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings
4: Pine Hills Road & SR 408 EB Ramps

2025 AM_No Build

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑		↱	↑↑
Traffic Volume (vph)	0	0	460	140	290	670
Future Volume (vph)	0	0	460	140	290	670
Satd. Flow (prot)	0	0	3449	0	1787	3574
Flt Permitted					0.950	
Satd. Flow (perm)	0	0	3449	0	1787	3574
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	0	0	484	147	305	705
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	631	0	305	705
Sign Control	Stop		Free			Free
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 39.9%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings
5: SR 408 WB ramps & Old Winter Garden Road

2025 AM_No Build

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↵	↵
Traffic Volume (vph)	870	0	0	600	330	100
Future Volume (vph)	870	0	0	600	330	100
Satd. Flow (prot)	3539	0	0	3539	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	3539	0	0	3539	1770	1583
Satd. Flow (RTOR)						89
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	916	0	0	632	347	105
Shared Lane Traffic (%)						
Lane Group Flow (vph)	916	0	0	632	347	105
Turn Type	NA			NA	Prot	Perm
Protected Phases	6			2	4	
Permitted Phases						4
Total Split (s)	70.0			70.0	60.0	60.0
Total Lost Time (s)	6.8			6.8	5.9	5.9
Act Effect Green (s)	85.4			85.4	31.9	31.9
Actuated g/C Ratio	0.66			0.66	0.25	0.25
v/c Ratio	0.39			0.27	0.80	0.23
Control Delay	11.8			10.5	59.6	10.4
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	11.8			10.5	59.6	10.4
LOS	B			B	E	B
Approach Delay	11.8			10.5	48.2	
Approach LOS	B			B	D	
Queue Length 50th (ft)	173			108	277	10
Queue Length 95th (ft)	269			173	351	52
Internal Link Dist (ft)	887			1119	1696	
Turn Bay Length (ft)					1000	
Base Capacity (vph)	2325			2325	736	710
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.39			0.27	0.47	0.15
Intersection Summary						
Cycle Length: 130						
Actuated Cycle Length: 130						
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.80						
Intersection Signal Delay: 19.6				Intersection LOS: B		

Lanes, Volumes, Timings
 5: SR 408 WB ramps & Old Winter Garden Road

2025 AM_No Build

Intersection Capacity Utilization 52.9%

ICU Level of Service A



















Analysis Period (min) 15

Splits and Phases: 5: SR 408 WB ramps & Old Winter Garden Road



Lanes, Volumes, Timings
6: John Young Parkway & SR 408 WB ramps

2025 AM_No Build

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	90	1520	0	0	1700	230	0	0	0	90	0	460
Future Volume (vph)	90	1520	0	0	1700	230	0	0	0	90	0	460
Satd. Flow (prot)	1719	4940	0	0	6225	1538	0	0	0	1719	0	2707
Flt Permitted	0.084									0.950		
Satd. Flow (perm)	152	4940	0	0	6225	1538	0	0	0	1719	0	2707
Satd. Flow (RTOR)					203							80
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	95	1600	0	0	1789	242	0	0	0	95	0	484
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	1600	0	0	1789	242	0	0	0	95	0	484
Turn Type	pm+pt	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases	2					6						3
Total Split (s)	27.0	114.0			87.0	87.0				56.0		56.0
Total Lost Time (s)	7.7	7.7			7.7	7.7				5.7		5.7
Act Effct Green (s)	124.6	124.6			97.6	97.6				32.0		32.0
Actuated g/C Ratio	0.73	0.73			0.57	0.57				0.19		0.19
v/c Ratio	0.33	0.44			0.50	0.25				0.29		0.84
Control Delay	15.9	6.8			22.9	4.6				60.0		68.6
Queue Delay	0.0	0.1			0.0	0.0				0.0		0.0
Total Delay	15.9	7.0			22.9	4.6				60.0		68.6
LOS	B	A			C	A				E		E
Approach Delay		7.5			20.7						67.2	
Approach LOS		A			C						E	
Queue Length 50th (ft)	37	140			335	18				92		254
Queue Length 95th (ft)	70	150			415	70				143		311
Internal Link Dist (ft)		347			2240			1041			1370	
Turn Bay Length (ft)						250				500		500
Base Capacity (vph)	289	3619			3572	969				508		857
Starvation Cap Reductn	0	824			0	0				0		0
Spillback Cap Reductn	0	0			0	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.33	0.57			0.50	0.25				0.19		0.56
Intersection Summary												
Cycle Length: 170												
Actuated Cycle Length: 170												
Offset: 68 (40%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.84												
Intersection Signal Delay: 21.8												
Intersection LOS: C												

Lanes, Volumes, Timings
 6: John Young Parkway & SR 408 WB ramps

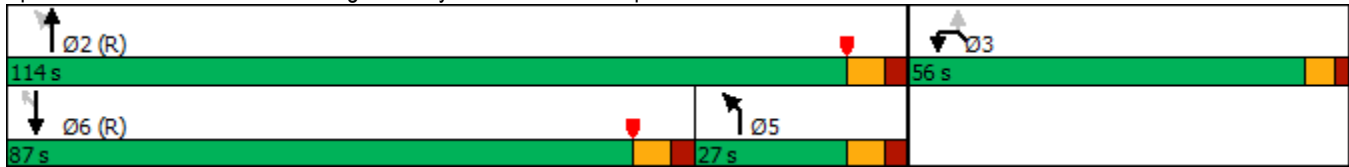
2025 AM_No Build

Intersection Capacity Utilization 71.1%

ICU Level of Service C
























Analysis Period (min) 15

Splits and Phases: 6: John Young Parkway & SR 408 WB ramps



Lanes, Volumes, Timings
7: John Young Parkway & SR 408 EB Ramps

2025 AM_No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			  	
Traffic Volume (vph)	220	0	230	0	0	0	0	1390	130	370	1420	0
Future Volume (vph)	220	0	230	0	0	0	0	1390	130	370	1420	0
Satd. Flow (prot)	3367	0	1553	0	0	0	0	4988	1553	1736	4988	0
Flt Permitted	0.950									0.107		
Satd. Flow (perm)	3367	0	1553	0	0	0	0	4988	1553	195	4988	0
Satd. Flow (RTOR)			72						97			
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	232	0	242	0	0	0	0	1463	137	389	1495	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	232	0	242	0	0	0	0	1463	137	389	1495	0
Turn Type	Prot		Perm					NA	Perm	pm+pt	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4						2	6		
Total Split (s)	42.0		42.0					73.0	73.0	55.0	128.0	
Total Lost Time (s)	6.8		6.8					7.1	7.1	7.1	7.1	
Act Effct Green (s)	24.8		24.8					88.0	88.0	131.3	131.3	
Actuated g/C Ratio	0.15		0.15					0.52	0.52	0.77	0.77	
v/c Ratio	0.47		0.84					0.57	0.16	0.81	0.39	
Control Delay	68.5		73.1					31.6	9.9	31.4	1.9	
Queue Delay	0.0		0.0					0.0	0.0	0.9	0.1	
Total Delay	68.5		73.1					31.6	9.9	32.2	2.0	
LOS	E		E					C	A	C	A	
Approach Delay		70.8						29.8			8.2	
Approach LOS		E						C			A	
Queue Length 50th (ft)	124		191					401	22	97	39	
Queue Length 95th (ft)	158		281					575	78	95	43	
Internal Link Dist (ft)		1163			951			1113			347	
Turn Bay Length (ft)	450								250			
Base Capacity (vph)	697		378					2582	850	584	3853	
Starvation Cap Reductn	0		0					0	0	51	793	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.33		0.64					0.57	0.16	0.73	0.49	
Intersection Summary												
Cycle Length: 170												
Actuated Cycle Length: 170												
Offset: 100 (59%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.84												
Intersection Signal Delay: 24.4												
Intersection LOS: C												

Lanes, Volumes, Timings 7: John Young Parkway & SR 408 EB Ramps

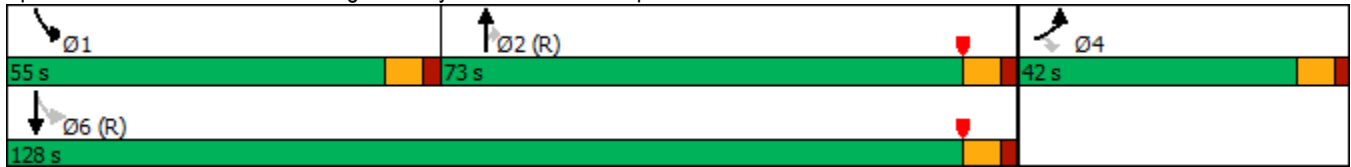
2025 AM_No Build

Intersection Capacity Utilization 71.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: John Young Parkway & SR 408 EB Ramps



Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	9:27	9:27	9:27	9:27	9:27	9:27	9:27
Total Time (min)	150	150	150	150	150	150	150
Time Recorded (min)	120	120	120	120	120	120	120
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	22926	22752	22840	22920	22485	22821	22842
Vehs Exited	22949	22767	22811	22978	22528	22807	22813
Starting Vehs	277	272	249	323	308	247	227
Ending Vehs	254	257	278	265	265	261	256
Denied Entry Before	2	0	3	3	1	3	3
Denied Entry After	3	2	3	3	1	2	3
Travel Distance (mi)	12590	12530	12578	12630	12331	12536	12497
Travel Time (hr)	567.8	558.7	560.8	572.7	553.2	565.8	556.3
Total Delay (hr)	184.9	178.3	179.1	188.7	177.9	184.6	176.1
Total Stops	13328	12865	12964	13541	12866	13161	12895
Fuel Used (gal)	425.1	419.5	419.9	425.6	413.5	421.4	418.9

Summary of All Intervals

Run Number	8	9	10	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	9:27	9:27	9:27	9:27
Total Time (min)	150	150	150	150
Time Recorded (min)	120	120	120	120
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	22667	22916	22839	22803
Vehs Exited	22676	22915	22856	22810
Starting Vehs	254	299	276	270
Ending Vehs	245	300	259	264
Denied Entry Before	3	1	4	0
Denied Entry After	3	2	2	0
Travel Distance (mi)	12401	12562	12489	12514
Travel Time (hr)	557.1	565.7	558.6	561.7
Total Delay (hr)	179.1	183.5	178.7	181.1
Total Stops	13061	13364	13076	13112
Fuel Used (gal)	416.3	422.7	419.8	420.3

Interval #0 Information Seeding

Start Time	6:57
End Time	7:27
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:27
End Time	9:27
Total Time (min)	120

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	6	7
Vehs Entered	22926	22752	22840	22920	22485	22821	22842
Vehs Exited	22949	22767	22811	22978	22528	22807	22813
Starting Vehs	277	272	249	323	308	247	227
Ending Vehs	254	257	278	265	265	261	256
Denied Entry Before	2	0	3	3	1	3	3
Denied Entry After	3	2	3	3	1	2	3
Travel Distance (mi)	12590	12530	12578	12630	12331	12536	12497
Travel Time (hr)	567.8	558.7	560.8	572.7	553.2	565.8	556.3
Total Delay (hr)	184.9	178.3	179.1	188.7	177.9	184.6	176.1
Total Stops	13328	12865	12964	13541	12866	13161	12895
Fuel Used (gal)	425.1	419.5	419.9	425.6	413.5	421.4	418.9

Interval #1 Information Recording

Start Time	7:27
End Time	9:27
Total Time (min)	120

Volumes adjusted by Growth Factors.

Run Number	8	9	10	Avg
Vehs Entered	22667	22916	22839	22803
Vehs Exited	22676	22915	22856	22810
Starting Vehs	254	299	276	270
Ending Vehs	245	300	259	264
Denied Entry Before	3	1	4	0
Denied Entry After	3	2	2	0
Travel Distance (mi)	12401	12562	12489	12514
Travel Time (hr)	557.1	565.7	558.6	561.7
Total Delay (hr)	179.1	183.5	178.7	181.1
Total Stops	13061	13364	13076	13112
Fuel Used (gal)	416.3	422.7	419.8	420.3

1: Kirkman Road & SR 408 WB ramps Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.1	0.2	0.0	0.0	0.1	0.3	0.7
Denied Del/Veh (s)	0.6	3.1	0.0	0.0	0.2	2.8	0.5
Total Delay (hr)	11.7	0.5	5.1	5.7	9.5	0.3	32.8
Total Del/Veh (s)	64.1	6.6	55.3	11.0	22.9	2.9	23.7
Travel Time (hr)	17.3	3.1	6.2	11.0	15.0	2.3	54.9
Avg Speed (mph)	8	19	5	17	16	29	13
Vehicles Entered	649	266	329	1862	1482	376	4964
Vehicles Exited	645	266	332	1862	1480	376	4961
Hourly Exit Rate	323	133	166	931	740	188	2481
Input Volume	320	130	170	930	740	190	2480
% of Volume	101	102	98	100	100	99	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

2: Kirkman Road & SR 408 EB Ramps Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.1	0.3	0.3	0.7	0.0	0.0	1.4
Denied Del/Veh (s)	0.7	2.5	0.7	2.6	0.0	0.0	0.9
Total Delay (hr)	13.1	1.2	5.0	0.9	2.6	6.7	29.5
Total Del/Veh (s)	66.9	10.2	11.9	3.6	77.4	11.9	18.7
Travel Time (hr)	21.0	6.5	12.9	7.2	2.9	12.3	62.8
Avg Speed (mph)	11	22	27	31	4	17	18
Vehicles Entered	698	431	1500	908	116	2009	5662
Vehicles Exited	690	431	1500	910	115	2009	5655
Hourly Exit Rate	345	216	750	455	58	1005	2828
Input Volume	350	210	750	460	60	1000	2830
% of Volume	99	103	100	99	96	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

3: Pine Hills Road & SR 408 WB ramps Performance by movement

Movement	WBL	WBR	NBT	SBT	All
Denied Delay (hr)	0.1	0.1	0.0	0.1	0.3
Denied Del/Veh (s)	2.8	0.4	0.0	0.3	0.3
Total Delay (hr)	0.7	0.9	0.1	0.2	2.0
Total Del/Veh (s)	25.8	5.4	0.4	0.5	2.1
Travel Time (hr)	1.6	6.0	1.3	6.2	15.0
Avg Speed (mph)	14	23	37	33	27
Vehicles Entered	101	625	925	1800	3451
Vehicles Exited	100	625	925	1801	3451
Hourly Exit Rate	50	313	463	901	1726
Input Volume	50	310	460	910	1730
% of Volume	100	101	101	99	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

4: Pine Hills Road & SR 408 EB Ramps Performance by movement

Movement	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.1
Total Delay (hr)	0.2	0.1	1.0	0.1	1.3
Total Del/Veh (s)	0.8	0.9	6.1	0.2	1.5
Travel Time (hr)	4.7	1.7	2.2	2.1	10.7
Avg Speed (mph)	38	31	14	35	31
Vehicles Entered	927	282	573	1328	3110
Vehicles Exited	925	282	573	1329	3109
Hourly Exit Rate	463	141	287	665	1555
Input Volume	460	140	290	670	1560
% of Volume	101	101	99	99	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

5: SR 408 WB ramps & Old Winter Garden Road Performance by movement

Movement	EBT	WBT	NBL	NBR	All
Denied Delay (hr)	0.1	0.0	0.4	0.0	0.5
Denied Del/Veh (s)	0.2	0.1	2.0	0.7	0.5
Total Delay (hr)	5.1	3.2	9.2	0.4	18.0
Total Del/Veh (s)	10.7	9.5	50.2	7.6	17.1
Travel Time (hr)	12.1	9.2	18.5	3.1	42.9
Avg Speed (mph)	26	29	12	21	20
Vehicles Entered	1714	1202	658	195	3769
Vehicles Exited	1720	1204	654	194	3772
Hourly Exit Rate	860	602	327	97	1886
Input Volume	870	600	330	100	1900
% of Volume	99	100	99	97	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

6: John Young Parkway & SR 408 WB ramps Performance by movement

Movement	NBL	NBT	SBT	SBR	NWL	NWR	All
Denied Delay (hr)	0.0	0.0	0.4	0.2	0.1	0.2	0.9
Denied Del/Veh (s)	0.0	0.0	0.5	1.4	2.7	0.6	0.4
Total Delay (hr)	1.6	5.2	11.3	0.8	3.7	5.9	28.5
Total Del/Veh (s)	35.6	6.0	11.8	6.1	76.1	22.8	12.4
Travel Time (hr)	2.1	11.6	44.1	5.1	5.5	15.1	83.5
Avg Speed (mph)	7	22	33	36	9	16	26
Vehicles Entered	165	3089	3403	459	175	922	8213
Vehicles Exited	165	3089	3415	460	173	921	8223
Hourly Exit Rate	83	1545	1708	230	87	461	4112
Input Volume	90	1536	1700	230	90	460	4106
% of Volume	92	101	100	100	96	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

7: John Young Parkway & SR 408 EB Ramps Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.4	0.1	0.1	0.2	0.0	0.0	0.9
Denied Del/Veh (s)	3.5	0.8	0.2	2.1	0.1	0.0	0.4
Total Delay (hr)	8.8	2.2	23.4	0.4	8.9	5.2	48.8
Total Del/Veh (s)	68.6	16.8	30.1	5.3	43.2	6.5	23.0
Travel Time (hr)	12.0	5.3	36.8	1.9	11.1	11.3	78.4
Avg Speed (mph)	9	20	16	30	6	23	15
Vehicles Entered	458	462	2779	265	730	2894	7588
Vehicles Exited	454	461	2770	264	734	2905	7588
Hourly Exit Rate	227	231	1385	132	367	1453	3794
Input Volume	220	230	1390	130	370	1438	3778
% of Volume	103	100	100	102	99	101	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Denied Delay (hr)	4.7
Denied Del/Veh (s)	0.7
Total Delay (hr)	176.4
Total Del/Veh (s)	27.5
Travel Time (hr)	561.7
Avg Speed (mph)	22
Vehicles Entered	22803
Vehicles Exited	22810
Hourly Exit Rate	11405
Input Volume	30634
% of Volume	37
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Kirkman Road & SR 408 WB ramps

Movement	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	T	T
Maximum Queue (ft)	277	299	101	274	196	243	264	309	286	209
Average Queue (ft)	143	175	38	136	74	101	120	195	149	48
95th Queue (ft)	232	253	70	228	155	200	231	288	253	149
Link Distance (ft)		1064		448	448	448	448	862	862	862
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	400		400							
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: Kirkman Road & SR 408 EB Ramps

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	T	T	T	T	L	T	T	T
Maximum Queue (ft)	281	301	142	168	221	188	107	153	170	234	252
Average Queue (ft)	150	175	60	45	101	64	11	58	71	103	118
95th Queue (ft)	234	255	106	109	182	148	47	117	142	197	227
Link Distance (ft)		1674			1184	1184	1184	448	448	448	448
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	300		300	400							
Storage Blk Time (%)	0	0									
Queuing Penalty (veh)	0	1									

Intersection: 3: Pine Hills Road & SR 408 WB ramps

Movement	WB	WB
Directions Served	L	R
Maximum Queue (ft)	90	116
Average Queue (ft)	35	57
95th Queue (ft)	68	86
Link Distance (ft)		1124
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	350	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Pine Hills Road & SR 408 EB Ramps

Movement	NB	SB
Directions Served	TR	L
Maximum Queue (ft)	29	136
Average Queue (ft)	3	56
95th Queue (ft)	16	97
Link Distance (ft)	1006	225
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: SR 408 WB ramps & Old Winter Garden Road

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	T	T	T	L	R
Maximum Queue (ft)	272	231	205	184	438	95
Average Queue (ft)	134	88	93	57	239	38
95th Queue (ft)	223	186	167	132	365	70
Link Distance (ft)	946	946	1165	1165		1730
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					1000	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: John Young Parkway & SR 408 WB ramps

Movement	NB	NB	NB	NB	SB	SB	SB	SB	NW	NW	NW
Directions Served	L	T	T	T	T	T	T	T	L	R	R
Maximum Queue (ft)	161	176	174	172	245	249	260	228	196	209	201
Average Queue (ft)	46	53	37	28	67	109	113	91	88	115	79
95th Queue (ft)	110	126	104	96	165	215	222	198	163	182	165
Link Distance (ft)	322	322	322	322		2222	2222	2222		1372	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					350				500		500
Storage Blk Time (%)								0			
Queuing Penalty (veh)								0			

Intersection: 7: John Young Parkway & SR 408 EB Ramps

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	T	T	T	R	L	T	T	T
Maximum Queue (ft)	219	246	203	514	470	405	239	353	236	248	262
Average Queue (ft)	102	144	74	301	259	184	9	194	35	64	71
95th Queue (ft)	192	212	143	458	416	342	85	328	130	162	168
Link Distance (ft)			1171	1113	1113	1113		322	322	322	322
Upstream Blk Time (%)								2			0
Queuing Penalty (veh)								8			0
Storage Bay Dist (ft)	450	450					250				
Storage Blk Time (%)							2				
Queuing Penalty (veh)							2				

Intersection: 27: Bend

Movement	WB
Directions Served	T
Maximum Queue (ft)	100
Average Queue (ft)	2
95th Queue (ft)	49
Link Distance (ft)	508
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 28: Bend








Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	73	36
Average Queue (ft)	2	1
95th Queue (ft)	25	13
Link Distance (ft)	115	115
Upstream Blk Time (%)	0	0
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 11

Lanes, Volumes, Timings
1: Kirkman Road & SR 408 WB ramps

2025 PM_No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	340	0	230	230	1260	0	0	940	300
Future Volume (vph)	0	0	0	340	0	230	230	1260	0	0	940	300
Satd. Flow (prot)	0	0	0	3467	0	1599	1787	5136	0	0	5136	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3467	0	1599	1787	5136	0	0	5136	1599
Satd. Flow (RTOR)						242						316
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	0	0	358	0	242	242	1326	0	0	989	316
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	358	0	242	242	1326	0	0	989	316
Turn Type				Prot		Perm	Prot	NA			NA	Perm
Protected Phases				4			1	6			2	
Permitted Phases						4						2
Total Split (s)				42.0		42.0	57.0	106.0			81.0	81.0
Total Lost Time (s)				7.0		7.0	7.9	6.9			7.0	7.0
Act Effct Green (s)				24.6		24.6	38.5	120.2			95.1	95.1
Actuated g/C Ratio				0.14		0.14	0.21	0.67			0.53	0.53
v/c Ratio				0.76		0.57	0.63	0.39			0.36	0.32
Control Delay				85.1		12.3	70.8	7.4			26.3	3.3
Queue Delay				0.0		0.0	0.6	0.1			0.0	0.0
Total Delay				85.1		12.3	71.3	7.5			26.3	3.3
LOS				F		B	E	A			C	A
Approach Delay					55.7			17.3			20.7	
Approach LOS					E			B			C	
Queue Length 50th (ft)				213		0	287	128			246	0
Queue Length 95th (ft)				262		84	400	138			323	58
Internal Link Dist (ft)		526			1048			446			818	
Turn Bay Length (ft)				400		400						300
Base Capacity (vph)				674		505	487	3428			2712	993
Starvation Cap Reductn				0		0	60	774			0	0
Spillback Cap Reductn				0		0	0	0			41	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.53		0.48	0.57	0.50			0.37	0.32
Intersection Summary												
Cycle Length: 180												
Actuated Cycle Length: 180												
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.76												
Intersection Signal Delay: 25.2						Intersection LOS: C						

Lane Group	Ø5	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	8
Permitted Phases		
Total Split (s)	32.0	42.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings 1: Kirkman Road & SR 408 WB ramps

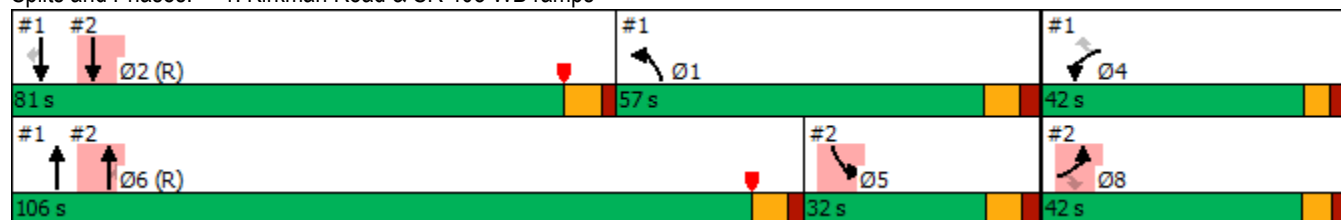
2025 PM _No Build

Intersection Capacity Utilization 59.3%

ICU Level of Service B

























Analysis Period (min) 15

Splits and Phases: 1: Kirkman Road & SR 408 WB ramps



Lanes, Volumes, Timings
2: Kirkman Road & SR 408 EB Ramps

2025 PM_No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			   	
Traffic Volume (vph)	220	0	220	0	0	0	0	1270	420	90	1190	0
Future Volume (vph)	220	0	220	0	0	0	0	1270	420	90	1190	0
Satd. Flow (prot)	3467	0	1599	0	0	0	0	6471	1599	1787	5136	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	3467	0	1599	0	0	0	0	6471	1599	1787	5136	0
Satd. Flow (RTOR)			232						442			
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	232	0	232	0	0	0	0	1337	442	95	1253	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	232	0	232	0	0	0	0	1337	442	95	1253	0
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	8							6		5	2	
Permitted Phases			8						6			
Total Split (s)	42.0		42.0					106.0	106.0	32.0	81.0	
Total Lost Time (s)	7.2		7.2					6.9	6.9	7.6	7.0	
Act Effct Green (s)	24.4		24.4					120.2	120.2	13.8	95.1	
Actuated g/C Ratio	0.14		0.14					0.67	0.67	0.08	0.53	
v/c Ratio	0.49		0.56					0.31	0.36	0.70	0.46	
Control Delay	75.1		12.3					13.5	2.0	117.0	11.8	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.1	
Total Delay	75.1		12.3					13.5	2.0	117.0	11.9	
LOS	E		B					B	A	F	B	
Approach Delay		43.7						10.6			19.3	
Approach LOS		D						B			B	
Queue Length 50th (ft)	132		0					184	0	116	187	
Queue Length 95th (ft)	174		84					247	46	180	280	
Internal Link Dist (ft)		1655			142			1141			446	
Turn Bay Length (ft)	300		300						250			
Base Capacity (vph)	670		496					4319	1214	242	2712	
Starvation Cap Reductn	0		0					0	0	0	494	
Spillback Cap Reductn	0		0					8	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.35		0.47					0.31	0.36	0.39	0.56	
Intersection Summary												
Cycle Length: 180												
Actuated Cycle Length: 180												
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.76												
Intersection Signal Delay: 18.2												
Intersection LOS: B												

Lane Group	Ø1	Ø4
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	1	4
Permitted Phases		
Total Split (s)	57.0	42.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings 2: Kirkman Road & SR 408 EB Ramps

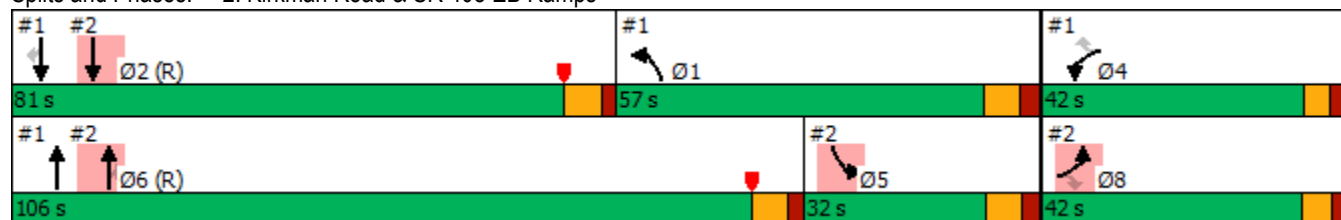
2025 PM _No Build

Intersection Capacity Utilization 59.3%

ICU Level of Service B











Analysis Period (min) 15

Splits and Phases: 2: Kirkman Road & SR 408 EB Ramps












Lanes, Volumes, Timings
3: Pine Hills Road & SR 408 WB ramps

2025 PM _No Build

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	50	380	690	0	0	860
Future Volume (vph)	50	380	690	0	0	860
Satd. Flow (prot)	1787	1599	3574	0	0	3574
Flt Permitted	0.950					
Satd. Flow (perm)	1787	1599	3574	0	0	3574
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	53	400	726	0	0	905
Shared Lane Traffic (%)						
Lane Group Flow (vph)	53	400	726	0	0	905
Sign Control	Stop		Free			Free
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 49.3%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings
4: Pine Hills Road & SR 408 EB Ramps

2025 PM _No Build

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	690	170	190	720
Future Volume (vph)	0	0	690	170	190	720
Satd. Flow (prot)	0	0	3467	0	1787	3574
Flt Permitted					0.950	
Satd. Flow (perm)	0	0	3467	0	1787	3574
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	0	0	726	179	200	758
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	905	0	200	758
Sign Control	Stop		Free			Free
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 49.3%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings
5: SR 408 WB ramps & Old Winter Garden Road

2025 PM _No Build

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↖	↗
Traffic Volume (vph)	710	0	0	1050	230	50
Future Volume (vph)	710	0	0	1050	230	50
Satd. Flow (prot)	3574	0	0	3574	1787	1599
Flt Permitted					0.950	
Satd. Flow (perm)	3574	0	0	3574	1787	1599
Satd. Flow (RTOR)						53
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	747	0	0	1105	242	53
Shared Lane Traffic (%)						
Lane Group Flow (vph)	747	0	0	1105	242	53
Turn Type	NA			NA	Prot	Perm
Protected Phases	6			2	4	
Permitted Phases						4
Total Split (s)	96.0			96.0	54.0	54.0
Total Lost Time (s)	6.8			6.8	5.9	5.9
Act Effect Green (s)	111.4			111.4	25.9	25.9
Actuated g/C Ratio	0.74			0.74	0.17	0.17
v/c Ratio	0.28			0.42	0.79	0.17
Control Delay	7.1			8.3	76.6	12.6
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	7.1			8.3	76.6	12.6
LOS	A			A	E	B
Approach Delay	7.1			8.3	65.1	
Approach LOS	A			A	E	
Queue Length 50th (ft)	112			191	230	0
Queue Length 95th (ft)	172			282	309	38
Internal Link Dist (ft)	887			1119	1696	
Turn Bay Length (ft)					1000	
Base Capacity (vph)	2654			2654	573	548
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.28			0.42	0.42	0.10
Intersection Summary						
Cycle Length: 150						
Actuated Cycle Length: 150						
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.79						
Intersection Signal Delay: 15.7				Intersection LOS: B		

Lanes, Volumes, Timings
 5: SR 408 WB ramps & Old Winter Garden Road

2025 PM _No Build

Intersection Capacity Utilization 52.4%

ICU Level of Service A
























Analysis Period (min) 15

Splits and Phases: 5: SR 408 WB ramps & Old Winter Garden Road



Lanes, Volumes, Timings
6: John Young Parkway & SR 408 WB ramps

2025 PM_No Build

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		  			  							 
Traffic Volume (vph)	150	1640	0	0	1930	370	0	0	0	70	0	250
Future Volume (vph)	150	1640	0	0	1930	370	0	0	0	70	0	250
Satd. Flow (prot)	1770	5085	0	0	6408	1583	0	0	0	1770	0	2787
Flt Permitted	0.062									0.950		
Satd. Flow (perm)	115	5085	0	0	6408	1583	0	0	0	1770	0	2787
Satd. Flow (RTOR)						311						90
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	158	1726	0	0	2032	389	0	0	0	74	0	263
Shared Lane Traffic (%)												
Lane Group Flow (vph)	158	1726	0	0	2032	389	0	0	0	74	0	263
Turn Type	pm+pt	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases	2					6						3
Total Split (s)	40.0	144.0			104.0	104.0				36.0		36.0
Total Lost Time (s)	7.7	7.7			7.7	7.7				5.7		5.7
Act Effct Green (s)	149.7	149.7			109.7	109.7				16.9		16.9
Actuated g/C Ratio	0.83	0.83			0.61	0.61				0.09		0.09
v/c Ratio	0.40	0.41			0.52	0.36				0.45		0.77
Control Delay	19.0	2.6			21.1	4.6				84.5		66.6
Queue Delay	0.0	0.2			0.0	0.0				0.0		0.0
Total Delay	19.0	2.8			21.1	4.6				84.5		66.6
LOS	B	A			C	A				F		E
Approach Delay		4.1			18.4						70.6	
Approach LOS		A			B						E	
Queue Length 50th (ft)	123	86			386	37				84		115
Queue Length 95th (ft)	m151	92			452	101				139		170
Internal Link Dist (ft)		347			2240			1041			1370	
Turn Bay Length (ft)						250				500		500
Base Capacity (vph)	392	4229			3906	1086				297		543
Starvation Cap Reductn	0	1375			0	0				0		0
Spillback Cap Reductn	0	0			0	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.40	0.60			0.52	0.36				0.25		0.48
Intersection Summary												
Cycle Length: 180												
Actuated Cycle Length: 180												
Offset: 108 (60%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.77												
Intersection Signal Delay: 16.4												
Intersection LOS: B												

Lanes, Volumes, Timings 6: John Young Parkway & SR 408 WB ramps

2025 PM _No Build

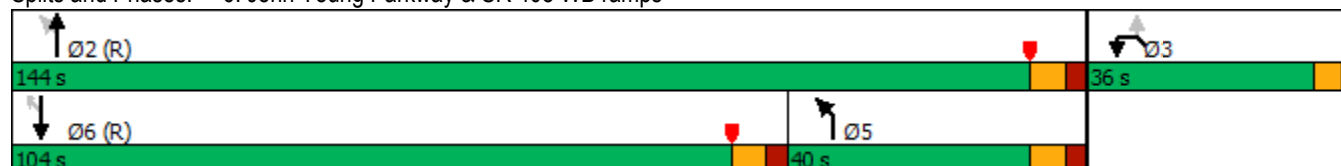
Intersection Capacity Utilization 85.3%

ICU Level of Service E

Analysis Period (min) 15
























m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: John Young Parkway & SR 408 WB ramps



Lanes, Volumes, Timings
7: John Young Parkway & SR 408 EB Ramps

2025 PM_No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			  	
Traffic Volume (vph)	160	0	130	0	0	0	0	1630	180	550	1450	0
Future Volume (vph)	160	0	130	0	0	0	0	1630	180	550	1450	0
Satd. Flow (prot)	3433	0	1583	0	0	0	0	5085	1583	1770	5085	0
Flt Permitted	0.950									0.059		
Satd. Flow (perm)	3433	0	1583	0	0	0	0	5085	1583	110	5085	0
Satd. Flow (RTOR)			96						112			
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	168	0	137	0	0	0	0	1716	189	579	1526	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	168	0	137	0	0	0	0	1716	189	579	1526	0
Turn Type	Prot		Perm					NA	Perm	pm+pt	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4						2	6		
Total Split (s)	23.0		23.0					81.0	81.0	76.0	157.0	
Total Lost Time (s)	6.8		6.8					7.1	7.1	7.1	7.1	
Act Effct Green (s)	13.8		13.8					86.4	86.4	152.3	152.3	
Actuated g/C Ratio	0.08		0.08					0.48	0.48	0.85	0.85	
v/c Ratio	0.64		0.66					0.70	0.23	0.91	0.35	
Control Delay	91.9		41.6					40.3	13.3	44.3	0.5	
Queue Delay	0.0		0.0					0.0	0.0	0.4	0.1	
Total Delay	91.9		41.6					40.3	13.3	44.7	0.6	
LOS	F		D					D	B	D	A	
Approach Delay		69.3						37.6			12.7	
Approach LOS		E						D			B	
Queue Length 50th (ft)	101		47					588	50	203	26	
Queue Length 95th (ft)	143		127					721	118	204	22	
Internal Link Dist (ft)		1163			951			1113			347	
Turn Bay Length (ft)	450								250			
Base Capacity (vph)	308		229					2439	817	728	4303	
Starvation Cap Reductn	0		0					0	0	18	1084	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.55		0.60					0.70	0.23	0.82	0.47	
Intersection Summary												
Cycle Length: 180												
Actuated Cycle Length: 180												
Offset: 144 (80%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.91												
Intersection Signal Delay: 27.7												
Intersection LOS: C												

Lanes, Volumes, Timings 7: John Young Parkway & SR 408 EB Ramps

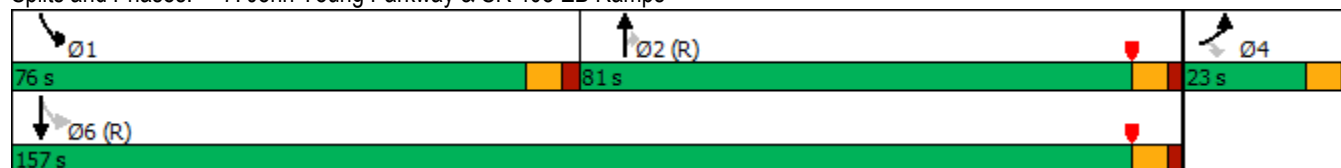
2025 PM _No Build

Intersection Capacity Utilization 85.3%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 7: John Young Parkway & SR 408 EB Ramps



Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	5:00	5:00	5:00	5:00	5:00	5:00	5:00
End Time	7:30	7:30	7:30	7:30	7:30	7:30	7:30
Total Time (min)	150	150	150	150	150	150	150
Time Recorded (min)	120	120	120	120	120	120	120
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	25877	25543	25648	25811	25641	25650	25751
Vehs Exited	25846	25547	25664	25798	25627	25645	25782
Starting Vehs	271	292	323	285	296	283	302
Ending Vehs	302	288	307	298	310	288	271
Denied Entry Before	3	1	1	0	4	2	4
Denied Entry After	2	2	3	3	5	1	1
Travel Distance (mi)	13934	13762	13849	13936	13864	13815	13925
Travel Time (hr)	649.9	633.9	642.6	650.1	641.2	640.8	650.1
Total Delay (hr)	234.9	223.9	230.4	235.2	228.8	229.0	235.0
Total Stops	14435	14061	14184	14273	13988	14186	14482
Fuel Used (gal)	473.0	465.1	468.7	472.3	467.8	468.6	473.3

Summary of All Intervals

Run Number	8	9	10	Avg
Start Time	5:00	5:00	5:00	5:00
End Time	7:30	7:30	7:30	7:30
Total Time (min)	150	150	150	150
Time Recorded (min)	120	120	120	120
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	25670	25726	25737	25706
Vehs Exited	25662	25717	25726	25701
Starting Vehs	291	309	300	298
Ending Vehs	299	318	311	303
Denied Entry Before	3	1	2	0
Denied Entry After	1	4	2	0
Travel Distance (mi)	13844	13884	13878	13869
Travel Time (hr)	642.9	637.9	639.3	642.9
Total Delay (hr)	230.5	224.6	225.6	229.8
Total Stops	14113	13992	13942	14167
Fuel Used (gal)	468.4	469.1	467.8	469.4

Interval #0 Information Seeding

Start Time	5:00
End Time	5:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	5:30
End Time	7:30
Total Time (min)	120

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	6	7
Vehs Entered	25877	25543	25648	25811	25641	25650	25751
Vehs Exited	25846	25547	25664	25798	25627	25645	25782
Starting Vehs	271	292	323	285	296	283	302
Ending Vehs	302	288	307	298	310	288	271
Denied Entry Before	3	1	1	0	4	2	4
Denied Entry After	2	2	3	3	5	1	1
Travel Distance (mi)	13934	13762	13849	13936	13864	13815	13925
Travel Time (hr)	649.9	633.9	642.6	650.1	641.2	640.8	650.1
Total Delay (hr)	234.9	223.9	230.4	235.2	228.8	229.0	235.0
Total Stops	14435	14061	14184	14273	13988	14186	14482
Fuel Used (gal)	473.0	465.1	468.7	472.3	467.8	468.6	473.3

Interval #1 Information Recording

Start Time	5:30
End Time	7:30
Total Time (min)	120

Volumes adjusted by Growth Factors.

Run Number	8	9	10	Avg
Vehs Entered	25670	25726	25737	25706
Vehs Exited	25662	25717	25726	25701
Starting Vehs	291	309	300	298
Ending Vehs	299	318	311	303
Denied Entry Before	3	1	2	0
Denied Entry After	1	4	2	0
Travel Distance (mi)	13844	13884	13878	13869
Travel Time (hr)	642.9	637.9	639.3	642.9
Total Delay (hr)	230.5	224.6	225.6	229.8
Total Stops	14113	13992	13942	14167
Fuel Used (gal)	468.4	469.1	467.8	469.4

1: Kirkman Road & SR 408 WB ramps Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.2	0.4	0.0	0.0	0.1	0.4	1.1
Denied Del/Veh (s)	0.9	3.0	0.0	0.0	0.2	2.5	0.6
Total Delay (hr)	13.9	1.6	7.4	6.0	13.5	0.6	43.0
Total Del/Veh (s)	70.9	12.3	57.1	8.5	25.9	3.6	23.3
Travel Time (hr)	19.8	6.1	8.9	12.3	20.5	3.7	71.5
Avg Speed (mph)	7	17	5	20	15	28	13
Vehicles Entered	690	469	458	2522	1871	602	6612
Vehicles Exited	691	468	457	2520	1871	602	6609
Hourly Exit Rate	346	234	229	1260	936	301	3305
Input Volume	340	230	230	1260	940	300	3300
% of Volume	102	102	99	100	100	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

2: Kirkman Road & SR 408 EB Ramps Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.1	0.3	0.4	0.5	0.0	0.0	1.3
Denied Del/Veh (s)	0.6	2.6	0.6	2.2	0.0	0.0	0.7
Total Delay (hr)	8.4	1.5	9.9	0.8	4.0	8.1	32.7
Total Del/Veh (s)	67.6	12.0	13.9	3.6	82.3	12.2	17.2
Travel Time (hr)	13.4	6.9	23.2	6.5	4.6	14.7	69.2
Avg Speed (mph)	10	21	25	31	4	17	19
Vehicles Entered	440	443	2538	833	171	2393	6818
Vehicles Exited	440	443	2539	833	171	2392	6818
Hourly Exit Rate	220	222	1270	417	86	1196	3409
Input Volume	220	220	1270	420	90	1191	3411
% of Volume	100	101	100	99	95	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

3: Pine Hills Road & SR 408 WB ramps Performance by movement

Movement	WBL	WBR	NBT	SBT	All
Denied Delay (hr)	0.1	0.1	0.0	0.1	0.3
Denied Del/Veh (s)	2.8	0.4	0.0	0.2	0.2
Total Delay (hr)	1.2	1.5	0.2	0.2	3.0
Total Del/Veh (s)	42.0	7.2	0.5	0.4	2.8
Travel Time (hr)	2.0	7.6	1.9	5.8	17.4
Avg Speed (mph)	11	21	36	34	26
Vehicles Entered	98	755	1362	1724	3939
Vehicles Exited	99	754	1362	1724	3939
Hourly Exit Rate	50	377	681	862	1970
Input Volume	50	380	690	860	1980
% of Volume	99	99	99	100	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

4: Pine Hills Road & SR 408 EB Ramps Performance by movement

Movement	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.1	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.1
Total Delay (hr)	0.4	0.1	0.8	0.1	1.4
Total Del/Veh (s)	1.1	1.2	7.4	0.2	1.4
Travel Time (hr)	7.0	2.2	1.6	2.2	13.0
Avg Speed (mph)	37	31	13	35	33
Vehicles Entered	1362	345	376	1450	3533
Vehicles Exited	1362	346	376	1450	3534
Hourly Exit Rate	681	173	188	725	1767
Input Volume	690	170	190	721	1771
% of Volume	99	102	99	101	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

5: SR 408 WB ramps & Old Winter Garden Road Performance by movement

Movement	EBT	WBT	NBL	NBR	All
Denied Delay (hr)	0.1	0.1	0.3	0.0	0.4
Denied Del/Veh (s)	0.1	0.2	2.0	0.5	0.4
Total Delay (hr)	2.9	4.8	8.1	0.2	15.9
Total Del/Veh (s)	7.2	8.1	61.1	5.8	13.8
Travel Time (hr)	8.7	15.3	14.6	1.6	40.2
Avg Speed (mph)	30	31	11	21	23
Vehicles Entered	1427	2108	465	105	4105
Vehicles Exited	1428	2105	465	105	4103
Hourly Exit Rate	714	1053	233	53	2052
Input Volume	710	1050	230	50	2040
% of Volume	101	100	101	105	101
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

6: John Young Parkway & SR 408 WB ramps Performance by movement

Movement	NBL	NBT	SBT	SBR	NWL	NWR	All
Denied Delay (hr)	0.0	0.0	0.7	0.3	0.1	0.1	1.2
Denied Del/Veh (s)	0.0	0.0	0.7	1.4	3.3	0.4	0.5
Total Delay (hr)	2.7	5.8	23.8	1.6	3.3	2.9	40.1
Total Del/Veh (s)	32.3	6.4	22.1	7.5	86.8	21.4	16.3
Travel Time (hr)	3.6	12.5	61.1	8.5	4.6	7.8	98.1
Avg Speed (mph)	7	22	27	35	8	17	25
Vehicles Entered	296	3282	3840	747	135	492	8792
Vehicles Exited	297	3283	3829	746	135	493	8783
Hourly Exit Rate	149	1642	1915	373	68	247	4392
Input Volume	150	1640	1930	370	70	250	4410
% of Volume	99	100	99	101	96	99	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

7: John Young Parkway & SR 408 EB Ramps Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.3	0.0	0.2	0.2	0.0	0.0	0.8
Denied Del/Veh (s)	3.7	0.6	0.2	2.0	0.0	0.0	0.3
Total Delay (hr)	7.9	1.0	40.4	1.0	15.6	2.9	68.9
Total Del/Veh (s)	88.8	13.9	44.3	10.2	51.5	3.7	30.2
Travel Time (hr)	10.1	2.8	56.2	3.1	19.0	9.0	100.2
Avg Speed (mph)	7	22	12	25	5	29	13
Vehicles Entered	318	264	3262	368	1082	2882	8176
Vehicles Exited	318	263	3260	368	1085	2885	8179
Hourly Exit Rate	159	132	1630	184	543	1443	4090
Input Volume	160	130	1630	180	550	1450	4100
% of Volume	99	101	100	102	99	99	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Denied Delay (hr)	5.1
Denied Del/Veh (s)	0.7
Total Delay (hr)	224.7
Total Del/Veh (s)	31.1
Travel Time (hr)	642.9
Avg Speed (mph)	22
Vehicles Entered	25706
Vehicles Exited	25701
Hourly Exit Rate	12851
Input Volume	34902
% of Volume	37
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Kirkman Road & SR 408 WB ramps

Movement	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	T	T
Maximum Queue (ft)	297	328	195	373	176	186	193	396	343	264
Average Queue (ft)	162	192	68	201	54	76	79	233	183	90
95th Queue (ft)	249	273	131	314	119	155	175	339	303	216
Link Distance (ft)		1064		448	448	448	448	862	862	862
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	400		400							
Storage Blk Time (%)										0
Queuing Penalty (veh)										0

Intersection: 2: Kirkman Road & SR 408 EB Ramps

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	T	T	T	T	L	T	T	T
Maximum Queue (ft)	199	216	177	192	297	270	211	192	218	273	300
Average Queue (ft)	89	119	68	61	145	120	57	89	78	97	106
95th Queue (ft)	167	183	123	135	246	226	151	160	164	218	249
Link Distance (ft)		1674			1184	1184	1184	448	448	448	448
Upstream Blk Time (%)											0
Queuing Penalty (veh)											0
Storage Bay Dist (ft)	300		300	400							
Storage Blk Time (%)					0		0				
Queuing Penalty (veh)					0		0				

Intersection: 3: Pine Hills Road & SR 408 WB ramps

Movement	WB	WB	NB	SB
Directions Served	L	R	T	T
Maximum Queue (ft)	124	174	4	2
Average Queue (ft)	40	72	0	0
95th Queue (ft)	84	119	2	1
Link Distance (ft)		1124	225	588
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	350			
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Pine Hills Road & SR 408 EB Ramps

Movement	NB	SB
Directions Served	TR	L
Maximum Queue (ft)	34	124
Average Queue (ft)	4	50
95th Queue (ft)	19	88
Link Distance (ft)	1006	225
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: SR 408 WB ramps & Old Winter Garden Road

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	T	T	T	L	R
Maximum Queue (ft)	213	186	254	244	362	73
Average Queue (ft)	92	48	119	94	194	27
95th Queue (ft)	166	122	207	189	306	57
Link Distance (ft)	946	946	1165	1165		1730
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					1000	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: John Young Parkway & SR 408 WB ramps

Movement	NB	NB	NB	NB	SB	SB	SB	SB	SB	NW	NW	NW
Directions Served	L	T	T	T	T	T	T	T	R	L	R	R
Maximum Queue (ft)	255	171	201	191	400	776	718	322	232	188	158	139
Average Queue (ft)	68	32	30	41	212	194	180	123	6	70	68	28
95th Queue (ft)	169	93	98	121	413	490	434	256	78	140	124	84
Link Distance (ft)	323	323	323	323		2222	2222	2222			1371	
Upstream Blk Time (%)	0		0	0								
Queuing Penalty (veh)	0		0	0								
Storage Bay Dist (ft)					350				250	500		500
Storage Blk Time (%)					6	0		0	0			
Queuing Penalty (veh)					29	0		0	1			

Intersection: 7: John Young Parkway & SR 408 EB Ramps

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	T	T	T	R	L	T	T	T
Maximum Queue (ft)	183	213	127	682	624	533	300	362	107	109	130
Average Queue (ft)	76	120	41	407	364	286	87	276	5	6	8
95th Queue (ft)	166	186	85	616	571	487	297	405	37	41	49
Link Distance (ft)			1176	1113	1113	1113		323	323	323	323
Upstream Blk Time (%)								17			
Queuing Penalty (veh)								84			
Storage Bay Dist (ft)	450	450					250				
Storage Blk Time (%)						11	0				
Queuing Penalty (veh)						19	1				

Intersection: 27: Bend

Movement	WB
Directions Served	T
Maximum Queue (ft)	101
Average Queue (ft)	2
95th Queue (ft)	50
Link Distance (ft)	508
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 28: Bend


Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	69	48
Average Queue (ft)	1	1
95th Queue (ft)	19	12
Link Distance (ft)	115	115
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 135

Lanes, Volumes, Timings
1: Kirkman Road & SR 408 WB ramps

2045 AM_No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↔↔		↗	↗	↑↑↑			↑↑↑	↗
Traffic Volume (vph)	0	0	0	400	0	170	210	1110	0	0	870	240
Future Volume (vph)	0	0	0	400	0	170	210	1110	0	0	870	240
Satd. Flow (prot)	0	0	0	3433	0	1583	1770	5085	0	0	5085	1583
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3433	0	1583	1770	5085	0	0	5085	1583
Satd. Flow (RTOR)						179						253
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	0	0	421	0	179	221	1168	0	0	916	253
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	421	0	179	221	1168	0	0	916	253
Turn Type				Prot		Perm	Prot	NA			NA	Perm
Protected Phases				4			1	6			2	
Permitted Phases						4						2
Total Split (s)				47.0		47.0	49.0	97.0			74.0	74.0
Total Lost Time (s)				7.0		7.0	7.9	6.9			7.0	7.0
Act Effect Green (s)				29.3		29.3	34.0	108.0			84.9	84.9
Actuated g/C Ratio				0.17		0.17	0.20	0.64			0.50	0.50
v/c Ratio				0.71		0.43	0.63	0.36			0.36	0.28
Control Delay				73.0		10.1	65.9	14.8			27.5	3.7
Queue Delay				0.0		0.0	0.0	0.2			0.0	0.0
Total Delay				73.0		10.1	65.9	15.0			27.6	3.7
LOS				E		B	E	B			C	A
Approach Delay					54.3			23.1			22.4	
Approach LOS					D			C			C	
Queue Length 50th (ft)				231		0	244	349			225	0
Queue Length 95th (ft)				278		68	349	418			299	55
Internal Link Dist (ft)		526			1048			446			818	
Turn Bay Length (ft)				400		400						300
Base Capacity (vph)				807		509	427	3229			2538	916
Starvation Cap Reductn				0		0	0	1115			0	0
Spillback Cap Reductn				0		0	0	0			59	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.52		0.35	0.52	0.55			0.37	0.28
Intersection Summary												
Cycle Length: 170												
Actuated Cycle Length: 170												
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.79												
Intersection Signal Delay: 28.8						Intersection LOS: C						

Lane Group	Ø5	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	8
Permitted Phases		
Total Split (s)	26.0	47.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings 1: Kirkman Road & SR 408 WB ramps

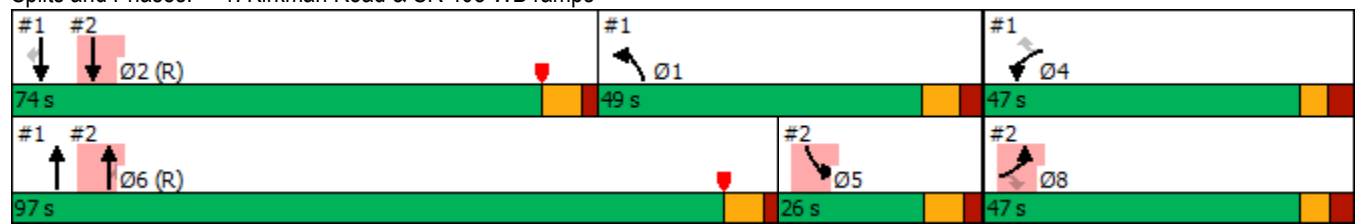
2045 AM_No Build

Intersection Capacity Utilization 71.3%

ICU Level of Service C

Analysis Period (min) 15
























Splits and Phases: 1: Kirkman Road & SR 408 WB ramps



Lanes, Volumes, Timings

2: Kirkman Road & SR 408 EB Ramps

2045 AM_No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			  	
Traffic Volume (vph)	440	0	260	0	0	0	0	880	590	70	1200	0
Future Volume (vph)	440	0	260	0	0	0	0	880	590	70	1200	0
Satd. Flow (prot)	3433	0	1583	0	0	0	0	6408	1583	1770	5085	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	3433	0	1583	0	0	0	0	6408	1583	1770	5085	0
Satd. Flow (RTOR)			274						621			
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	463	0	274	0	0	0	0	926	621	74	1263	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	463	0	274	0	0	0	0	926	621	74	1263	0
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	8							6		5	2	
Permitted Phases			8						6			
Total Split (s)	47.0		47.0					97.0	97.0	26.0	74.0	
Total Lost Time (s)	7.2		7.2					6.9	6.9	7.6	7.0	
Act Effct Green (s)	29.1		29.1					108.0	108.0	11.3	84.9	
Actuated g/C Ratio	0.17		0.17					0.64	0.64	0.07	0.50	
v/c Ratio	0.79		0.55					0.23	0.50	0.63	0.50	
Control Delay	77.4		10.1					14.2	2.6	105.2	15.0	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.2	
Total Delay	77.4		10.1					14.2	2.6	105.2	15.2	
LOS	E		B					B	A	F	B	
Approach Delay		52.4						9.5			20.2	
Approach LOS		D						A			C	
Queue Length 50th (ft)	258		0					122	0	85	420	
Queue Length 95th (ft)	308		83					170	55	140	424	
Internal Link Dist (ft)		1655			142			1141			446	
Turn Bay Length (ft)	300		300						250			
Base Capacity (vph)	803		580					4069	1232	191	2538	
Starvation Cap Reductn	0		0					0	0	0	415	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.58		0.47					0.23	0.50	0.39	0.59	
Intersection Summary												
Cycle Length: 170												
Actuated Cycle Length: 170												
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.79												
Intersection Signal Delay: 22.2												
Intersection LOS: C												

Lane Group	Ø1	Ø4
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	1	4
Permitted Phases		
Total Split (s)	49.0	47.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings 2: Kirkman Road & SR 408 EB Ramps

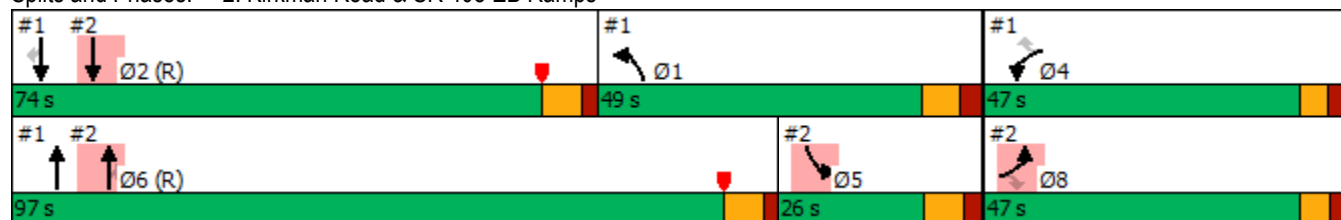
2045 AM_No Build

Intersection Capacity Utilization 71.3%

ICU Level of Service C













Analysis Period (min) 15

Splits and Phases: 2: Kirkman Road & SR 408 EB Ramps












Lanes, Volumes, Timings
3: Pine Hills Road & SR 408 WB ramps

2045 AM_No Build

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	70	390	540	0	0	1060
Future Volume (vph)	70	390	540	0	0	1060
Satd. Flow (prot)	1787	1599	3574	0	0	3574
Flt Permitted	0.950					
Satd. Flow (perm)	1787	1599	3574	0	0	3574
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	74	411	568	0	0	1116
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	411	568	0	0	1116
Sign Control	Stop		Free			Free
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 47.0%				ICU Level of Service A		
Analysis Period (min) 15						







Lanes, Volumes, Timings
4: Pine Hills Road & SR 408 EB Ramps

2045 AM_No Build

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	540	170	360	770
Future Volume (vph)	0	0	540	170	360	770
Satd. Flow (prot)	0	0	3446	0	1787	3574
Flt Permitted					0.950	
Satd. Flow (perm)	0	0	3446	0	1787	3574
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	0	0	568	179	379	811
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	747	0	379	811
Sign Control	Stop		Free			Free
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 47.0%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings
5: SR 408 WB ramps & Old Winter Garden Road

2045 AM_No Build

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↵	↵
Traffic Volume (vph)	980	0	0	680	390	130
Future Volume (vph)	980	0	0	680	390	130
Satd. Flow (prot)	3539	0	0	3539	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	3539	0	0	3539	1770	1583
Satd. Flow (RTOR)						61
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	1032	0	0	716	411	137
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1032	0	0	716	411	137
Turn Type	NA			NA	Prot	Perm
Protected Phases	6			2	4	
Permitted Phases						4
Total Split (s)	69.0			69.0	61.0	61.0
Total Lost Time (s)	6.8			6.8	5.9	5.9
Act Effect Green (s)	80.4			80.4	36.9	36.9
Actuated g/C Ratio	0.62			0.62	0.28	0.28
v/c Ratio	0.47			0.33	0.82	0.28
Control Delay	15.3			13.4	56.4	19.4
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	15.3			13.4	56.4	19.4
LOS	B			B	E	B
Approach Delay	15.3			13.4	47.2	
Approach LOS	B			B	D	
Queue Length 50th (ft)	231			142	324	48
Queue Length 95th (ft)	349			222	399	91
Internal Link Dist (ft)	887			1119	1696	
Turn Bay Length (ft)					1000	
Base Capacity (vph)	2189			2189	750	706
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.47			0.33	0.55	0.19
Intersection Summary						
Cycle Length: 130						
Actuated Cycle Length: 130						
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.82						
Intersection Signal Delay: 22.3				Intersection LOS: C		

Lanes, Volumes, Timings
5: SR 408 WB ramps & Old Winter Garden Road

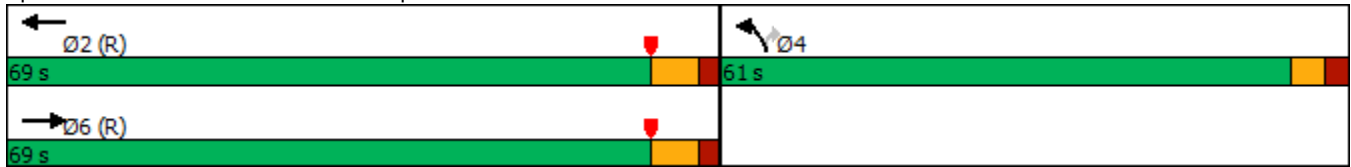
2045 AM_No Build

Intersection Capacity Utilization 59.3%

ICU Level of Service B



















Analysis Period (min) 15

Splits and Phases: 5: SR 408 WB ramps & Old Winter Garden Road



Lanes, Volumes, Timings
6: John Young Parkway & SR 408 WB ramps

2045 AM_No Build

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	110	1780	0	0	1980	280	0	0	0	100	0	570
Future Volume (vph)	110	1780	0	0	1980	280	0	0	0	100	0	570
Satd. Flow (prot)	1719	4940	0	0	6225	1538	0	0	0	1719	0	2707
Flt Permitted	0.051									0.950		
Satd. Flow (perm)	92	4940	0	0	6225	1538	0	0	0	1719	0	2707
Satd. Flow (RTOR)						213						80
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	116	1874	0	0	2084	295	0	0	0	105	0	600
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	1874	0	0	2084	295	0	0	0	105	0	600
Turn Type	pm+pt	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases	2					6						3
Total Split (s)	26.0	113.0			87.0	87.0				57.0		57.0
Total Lost Time (s)	7.7	7.7			7.7	7.7				5.7		5.7
Act Effct Green (s)	116.7	116.7			90.7	90.7				39.9		39.9
Actuated g/C Ratio	0.69	0.69			0.53	0.53				0.23		0.23
v/c Ratio	0.49	0.55			0.63	0.32				0.26		0.86
Control Delay	22.7	8.0			29.7	7.7				53.0		66.6
Queue Delay	0.0	0.2			0.0	0.0				0.0		0.0
Total Delay	22.7	8.2			29.7	7.7				53.0		66.6
LOS	C	A			C	A				D		E
Approach Delay		9.1			27.0						64.6	
Approach LOS		A			C						E	
Queue Length 50th (ft)	86	137			464	44				96		324
Queue Length 95th (ft)	m96	163			564	119				145		380
Internal Link Dist (ft)		347			2240			1041			1370	
Turn Bay Length (ft)						250				500		500
Base Capacity (vph)	238	3391			3322	920				518		872
Starvation Cap Reductn	0	674			0	0				0		0
Spillback Cap Reductn	0	0			57	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.49	0.69			0.64	0.32				0.20		0.69
Intersection Summary												
Cycle Length: 170												
Actuated Cycle Length: 170												
Offset: 81 (48%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.86												
Intersection Signal Delay: 25.2												
Intersection LOS: C												

Lanes, Volumes, Timings 6: John Young Parkway & SR 408 WB ramps

2045 AM_No Build

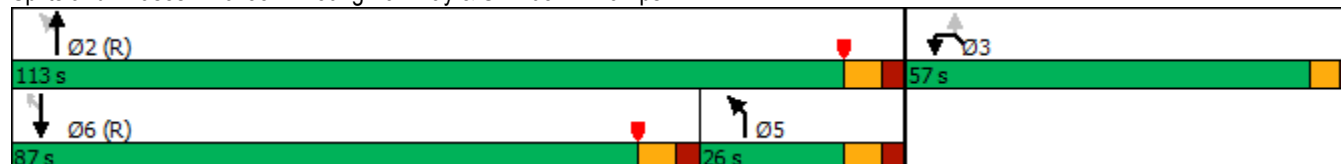
Intersection Capacity Utilization 80.9%

ICU Level of Service D

Analysis Period (min) 15
























m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: John Young Parkway & SR 408 WB ramps



Lanes, Volumes, Timings
7: John Young Parkway & SR 408 EB Ramps

2045 AM_No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			  	
Traffic Volume (vph)	270	0	280	0	0	0	0	1620	160	440	1640	0
Future Volume (vph)	270	0	280	0	0	0	0	1620	160	440	1640	0
Satd. Flow (prot)	3367	0	1553	0	0	0	0	4988	1553	1736	4988	0
Flt Permitted	0.950									0.052		
Satd. Flow (perm)	3367	0	1553	0	0	0	0	4988	1553	95	4988	0
Satd. Flow (RTOR)			72						103			
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	284	0	295	0	0	0	0	1705	168	463	1726	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	284	0	295	0	0	0	0	1705	168	463	1726	0
Turn Type	Prot		Perm					NA	Perm	pm+pt	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4						2	6		
Total Split (s)	40.0		40.0					74.0	74.0	56.0	130.0	
Total Lost Time (s)	6.8		6.8					7.1	7.1	7.1	7.1	
Act Effct Green (s)	29.1		29.1					76.0	76.0	127.0	127.0	
Actuated g/C Ratio	0.17		0.17					0.45	0.45	0.75	0.75	
v/c Ratio	0.49		0.91					0.76	0.22	0.94	0.46	
Control Delay	66.1		82.2					44.0	13.7	77.3	1.6	
Queue Delay	0.0		0.0					0.0	0.0	5.1	0.1	
Total Delay	66.1		82.2					44.0	13.7	82.4	1.6	
LOS	E		F					D	B	F	A	
Approach Delay		74.3						41.3			18.7	
Approach LOS		E						D			B	
Queue Length 50th (ft)	146		249					616	44	223	41	
Queue Length 95th (ft)	195		#399					705	103	#409	42	
Internal Link Dist (ft)		1163			951			1113			347	
Turn Bay Length (ft)	450								250			
Base Capacity (vph)	657		361					2229	751	542	3726	
Starvation Cap Reductn	0		0					0	0	43	544	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.43		0.82					0.76	0.22	0.93	0.54	
Intersection Summary												
Cycle Length: 170												
Actuated Cycle Length: 170												
Offset: 104 (61%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.94												
Intersection Signal Delay: 34.8												
Intersection LOS: C												

Lanes, Volumes, Timings 7: John Young Parkway & SR 408 EB Ramps

2045 AM_No Build

Intersection Capacity Utilization 80.9%

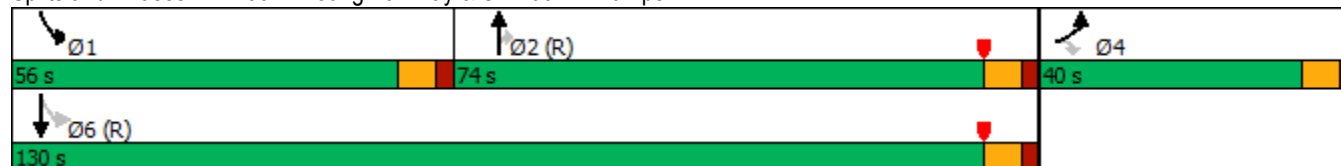
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 7: John Young Parkway & SR 408 EB Ramps



Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	9:27	9:27	9:27	9:27	9:27	9:27	9:27
Total Time (min)	150	150	150	150	150	150	150
Time Recorded (min)	120	120	120	120	120	120	120
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	27099	27015	26754	27177	27011	27332	27213
Vehs Exited	27133	27065	26774	27196	27078	27375	27276
Starting Vehs	326	344	343	378	378	405	405
Ending Vehs	292	294	323	359	311	362	342
Denied Entry Before	1	2	0	6	3	6	2
Denied Entry After	4	5	5	2	4	4	1
Travel Distance (mi)	14895	14817	14679	14894	14819	14950	14928
Travel Time (hr)	705.6	703.2	693.2	707.7	699.3	707.0	706.9
Total Delay (hr)	250.0	250.3	245.1	253.1	246.9	250.6	251.0
Total Stops	16946	16813	16493	16851	16587	16868	16833
Fuel Used (gal)	511.4	509.0	503.9	513.5	508.6	513.0	513.4

Summary of All Intervals

Run Number	8	9	10	Avg
Start Time	6:57	6:57	6:57	6:57
End Time	9:27	9:27	9:27	9:27
Total Time (min)	150	150	150	150
Time Recorded (min)	120	120	120	120
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	27110	27059	27239	27101
Vehs Exited	27162	27089	27333	27148
Starting Vehs	402	420	410	386
Ending Vehs	350	390	316	333
Denied Entry Before	2	0	4	0
Denied Entry After	2	2	6	1
Travel Distance (mi)	14866	14835	15005	14869
Travel Time (hr)	712.2	702.1	714.7	705.2
Total Delay (hr)	258.0	248.8	256.4	251.0
Total Stops	17155	16795	17218	16854
Fuel Used (gal)	513.1	510.1	516.3	511.2

Interval #0 Information Seeding

Start Time	6:57
End Time	7:27
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:27
End Time	9:27
Total Time (min)	120

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	6	7
Vehs Entered	27099	27015	26754	27177	27011	27332	27213
Vehs Exited	27133	27065	26774	27196	27078	27375	27276
Starting Vehs	326	344	343	378	378	405	405
Ending Vehs	292	294	323	359	311	362	342
Denied Entry Before	1	2	0	6	3	6	2
Denied Entry After	4	5	5	2	4	4	1
Travel Distance (mi)	14895	14817	14679	14894	14819	14950	14928
Travel Time (hr)	705.6	703.2	693.2	707.7	699.3	707.0	706.9
Total Delay (hr)	250.0	250.3	245.1	253.1	246.9	250.6	251.0
Total Stops	16946	16813	16493	16851	16587	16868	16833
Fuel Used (gal)	511.4	509.0	503.9	513.5	508.6	513.0	513.4

Interval #1 Information Recording

Start Time	7:27
End Time	9:27
Total Time (min)	120

Volumes adjusted by Growth Factors.

Run Number	8	9	10	Avg
Vehs Entered	27110	27059	27239	27101
Vehs Exited	27162	27089	27333	27148
Starting Vehs	402	420	410	386
Ending Vehs	350	390	316	333
Denied Entry Before	2	0	4	0
Denied Entry After	2	2	6	1
Travel Distance (mi)	14866	14835	15005	14869
Travel Time (hr)	712.2	702.1	714.7	705.2
Total Delay (hr)	258.0	248.8	256.4	251.0
Total Stops	17155	16795	17218	16854
Fuel Used (gal)	513.1	510.1	516.3	511.2

1: Kirkman Road & SR 408 WB ramps Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.2	0.3	0.0	0.0	0.1	0.3	0.9
Denied Del/Veh (s)	0.8	3.0	0.0	0.0	0.2	2.6	0.5
Total Delay (hr)	13.8	0.8	6.0	8.7	13.8	0.4	43.6
Total Del/Veh (s)	61.4	8.4	52.2	14.1	28.4	3.4	26.1
Travel Time (hr)	20.7	4.1	7.4	15.1	20.3	2.9	70.5
Avg Speed (mph)	8	18	5	15	14	29	12
Vehicles Entered	800	342	410	2210	1743	480	5985
Vehicles Exited	796	342	414	2213	1739	481	5985
Hourly Exit Rate	398	171	207	1107	870	241	2993
Input Volume	400	170	210	1111	870	240	3001
% of Volume	100	101	99	100	100	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

2: Kirkman Road & SR 408 EB Ramps Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.2	0.4	0.4	0.8	0.0	0.0	1.7
Denied Del/Veh (s)	0.9	2.5	0.8	2.5	0.0	0.0	0.9
Total Delay (hr)	15.6	2.1	7.3	1.5	2.7	9.9	39.1
Total Del/Veh (s)	63.5	14.0	14.9	4.7	72.8	14.8	20.5
Travel Time (hr)	25.5	8.4	16.5	9.5	3.2	16.7	79.9
Avg Speed (mph)	11	21	25	29	4	15	17
Vehicles Entered	873	523	1752	1158	134	2401	6841
Vehicles Exited	866	524	1752	1159	132	2407	6840
Hourly Exit Rate	433	262	876	580	66	1204	3420
Input Volume	440	260	880	590	70	1200	3440
% of Volume	98	101	100	98	94	100	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	1	0	0	1

3: Pine Hills Road & SR 408 WB ramps Performance by movement

Movement	WBL	WBR	NBT	SBT	All
Denied Delay (hr)	0.1	0.1	0.0	0.2	0.4
Denied Del/Veh (s)	2.8	0.5	0.0	0.3	0.4
Total Delay (hr)	2.4	1.4	0.1	0.4	4.4
Total Del/Veh (s)	61.5	6.5	0.5	0.7	3.9
Travel Time (hr)	3.6	7.7	1.5	7.5	20.3
Avg Speed (mph)	9	22	36	33	25
Vehicles Entered	141	777	1062	2142	4122
Vehicles Exited	140	776	1062	2142	4120
Hourly Exit Rate	70	388	531	1071	2060
Input Volume	70	390	540	1060	2060
% of Volume	100	99	98	101	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

4: Pine Hills Road & SR 408 EB Ramps Performance by movement

Movement	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.1
Total Delay (hr)	0.3	0.1	1.9	0.1	2.5
Total Del/Veh (s)	1.1	1.3	9.3	0.2	2.4
Travel Time (hr)	5.5	2.2	3.5	2.5	13.7
Avg Speed (mph)	37	31	11	34	29
Vehicles Entered	1061	350	740	1542	3693
Vehicles Exited	1062	351	741	1542	3696
Hourly Exit Rate	531	176	371	771	1848
Input Volume	540	170	360	770	1840
% of Volume	98	103	103	100	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

5: SR 408 WB ramps & Old Winter Garden Road Performance by movement

Movement	EBT	WBT	NBL	NBR	All
Denied Delay (hr)	0.1	0.1	0.4	0.1	0.6
Denied Del/Veh (s)	0.2	0.1	2.1	0.8	0.5
Total Delay (hr)	7.4	4.5	10.2	0.7	22.9
Total Del/Veh (s)	13.6	12.0	47.3	9.7	18.9
Travel Time (hr)	15.3	11.3	21.0	4.5	52.1
Avg Speed (mph)	23	27	12	20	19
Vehicles Entered	1942	1354	771	269	4336
Vehicles Exited	1948	1358	769	269	4344
Hourly Exit Rate	974	679	385	135	2172
Input Volume	980	680	390	130	2180
% of Volume	99	100	99	103	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

6: John Young Parkway & SR 408 WB ramps Performance by movement

Movement	NBL	NBT	SBT	SBR	NWL	NWR	All
Denied Delay (hr)	0.0	0.0	0.5	0.2	0.1	0.2	1.1
Denied Del/Veh (s)	0.0	0.0	0.5	1.4	2.7	0.7	0.4
Total Delay (hr)	1.9	7.5	16.0	1.1	4.2	9.7	40.4
Total Del/Veh (s)	33.0	7.5	14.5	6.8	75.9	30.3	14.9
Travel Time (hr)	2.5	15.1	54.1	6.4	6.1	21.2	105.5
Avg Speed (mph)	7	20	31	35	9	14	25
Vehicles Entered	207	3607	3940	577	197	1142	9670
Vehicles Exited	207	3618	3963	576	195	1142	9701
Hourly Exit Rate	104	1809	1982	288	98	571	4851
Input Volume	110	1799	1980	280	100	570	4839
% of Volume	94	101	100	103	98	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

7: John Young Parkway & SR 408 EB Ramps Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.5	0.2	0.2	0.2	0.1	0.0	1.1
Denied Del/Veh (s)	3.4	1.0	0.2	2.0	0.2	0.0	0.4
Total Delay (hr)	11.0	4.2	38.8	0.7	11.8	4.8	71.4
Total Del/Veh (s)	71.1	26.7	42.7	7.9	48.6	5.2	28.8
Travel Time (hr)	14.8	8.1	54.5	2.5	14.6	11.8	106.4
Avg Speed (mph)	9	16	13	27	5	25	13
Vehicles Entered	552	568	3250	320	868	3330	8888
Vehicles Exited	550	565	3229	320	873	3333	8870
Hourly Exit Rate	275	283	1615	160	437	1667	4435
Input Volume	270	280	1620	160	440	1660	4430
% of Volume	102	101	100	100	99	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Denied Delay (hr)	6.0
Denied Del/Veh (s)	0.8
Total Delay (hr)	245.0
Total Del/Veh (s)	32.1
Travel Time (hr)	705.2
Avg Speed (mph)	21
Vehicles Entered	27101
Vehicles Exited	27148
Hourly Exit Rate	13574
Input Volume	36420
% of Volume	37
Denied Entry Before	0
Denied Entry After	1

Intersection: 1: Kirkman Road & SR 408 WB ramps

Movement	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	T	T
Maximum Queue (ft)	323	357	129	333	271	302	317	406	385	254
Average Queue (ft)	175	207	46	173	106	139	155	237	191	92
95th Queue (ft)	267	298	87	279	211	266	287	343	309	214
Link Distance (ft)		1064		448	448	448	448	862	862	862
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	400		400							
Storage Blk Time (%)		0							0	
Queuing Penalty (veh)		0							0	

Intersection: 2: Kirkman Road & SR 408 EB Ramps

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	T	T	T	T	L	T	T	T
Maximum Queue (ft)	346	368	239	196	242	211	150	168	253	291	297
Average Queue (ft)	184	209	82	66	119	87	21	67	98	135	150
95th Queue (ft)	281	300	152	143	207	180	78	131	189	253	279
Link Distance (ft)		1674			1184	1184	1184	448	448	448	448
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	300		300	400							
Storage Blk Time (%)	0	1									
Queuing Penalty (veh)	1	4									

Intersection: 3: Pine Hills Road & SR 408 WB ramps

Movement	WB	WB	SB	SB
Directions Served	L	R	T	T
Maximum Queue (ft)	172	141	23	15
Average Queue (ft)	59	69	1	0
95th Queue (ft)	121	107	16	13
Link Distance (ft)		1124	588	588
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	350			
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report

2045 AM No Build

02/03/2023

Intersection: 4: Pine Hills Road & SR 408 EB Ramps

Movement	NB	NB	SB
Directions Served	T	TR	L
Maximum Queue (ft)	2	45	195
Average Queue (ft)	0	7	82
95th Queue (ft)	2	25	147
Link Distance (ft)	1006	1006	225
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: SR 408 WB ramps & Old Winter Garden Road

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	T	T	T	L	R
Maximum Queue (ft)	325	293	226	217	520	123
Average Queue (ft)	166	123	115	82	270	49
95th Queue (ft)	269	237	191	169	424	89
Link Distance (ft)	946	946	1165	1165		1730
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					1000	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: John Young Parkway & SR 408 WB ramps

Movement	NB	NB	NB	NB	SB	SB	SB	SB	SB	NW	NW	NW
Directions Served	L	T	T	T	T	T	T	T	R	L	R	R
Maximum Queue (ft)	200	189	199	233	368	390	336	256	58	225	311	285
Average Queue (ft)	58	65	53	70	109	142	148	124	1	97	153	128
95th Queue (ft)	134	147	138	175	240	269	266	234	29	170	241	226
Link Distance (ft)	322	322	322	322		2222	2222	2222			1372	
Upstream Blk Time (%)					0							
Queuing Penalty (veh)					0							
Storage Bay Dist (ft)					350				250	500		500
Storage Blk Time (%)					1			0	0			
Queuing Penalty (veh)					3			0	0			

Intersection: 7: John Young Parkway & SR 408 EB Ramps

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	T	T	T	R	L	T	T	T
Maximum Queue (ft)	252	280	298	633	613	508	300	362	135	148	149
Average Queue (ft)	127	166	112	407	365	284	58	234	14	40	43
95th Queue (ft)	217	240	211	586	547	462	246	373	65	105	109
Link Distance (ft)			1171	1113	1113	1113		322	322	322	322
Upstream Blk Time (%)								6			
Queuing Penalty (veh)								33			
Storage Bay Dist (ft)	450	450					250				
Storage Blk Time (%)						9	0				
Queuing Penalty (veh)						14	0				

Intersection: 27: Bend

Movement	WB	WB
Directions Served	T	
Maximum Queue (ft)	93	6
Average Queue (ft)	2	0
95th Queue (ft)	44	4
Link Distance (ft)	508	508
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 28: Bend



















Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	87	76
Average Queue (ft)	3	2
95th Queue (ft)	30	24
Link Distance (ft)	115	115
Upstream Blk Time (%)	0	0
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 55

Lanes, Volumes, Timings
1: Kirkman Road & SR 408 WB ramps

2045 PM _No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	420	0	290	290	1480	0	0	1110	380
Future Volume (vph)	0	0	0	420	0	290	290	1480	0	0	1110	380
Satd. Flow (prot)	0	0	0	3467	0	1599	1787	5136	0	0	5136	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3467	0	1599	1787	5136	0	0	5136	1599
Satd. Flow (RTOR)						239						400
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	0	0	442	0	305	305	1558	0	0	1168	400
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	442	0	305	305	1558	0	0	1168	400
Turn Type				Prot		Perm	Prot	NA			NA	Perm
Protected Phases				4			1	6			2	
Permitted Phases						4						2
Total Split (s)				44.0		44.0	58.0	105.0			78.0	78.0
Total Lost Time (s)				7.0		7.0	7.9	6.9			7.0	7.0
Act Effect Green (s)				29.4		29.4	42.6	113.3			86.2	86.2
Actuated g/C Ratio				0.16		0.16	0.24	0.63			0.48	0.48
v/c Ratio				0.78		0.66	0.72	0.48			0.48	0.41
Control Delay				82.1		23.0	69.9	10.0			33.7	4.0
Queue Delay				0.0		0.0	2.8	0.1			0.0	0.0
Total Delay				82.1		23.0	72.7	10.1			33.8	4.0
LOS				F		C	E	B			C	A
Approach Delay					57.9			20.4			26.2	
Approach LOS					E			C			C	
Queue Length 50th (ft)				262		70	372	160			336	0
Queue Length 95th (ft)				312		177	488	170			438	69
Internal Link Dist (ft)		526			1048			446			818	
Turn Bay Length (ft)				400		400						300
Base Capacity (vph)				712		518	497	3231			2458	973
Starvation Cap Reductn				0		0	103	391			0	0
Spillback Cap Reductn				0		0	0	0			169	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.62		0.59	0.77	0.55			0.51	0.41
Intersection Summary												
Cycle Length: 180												
Actuated Cycle Length: 180												
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.78												
Intersection Signal Delay: 29.3						Intersection LOS: C						

Lane Group	Ø5	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	5	8
Permitted Phases		
Total Split (s)	31.0	44.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings 1: Kirkman Road & SR 408 WB ramps

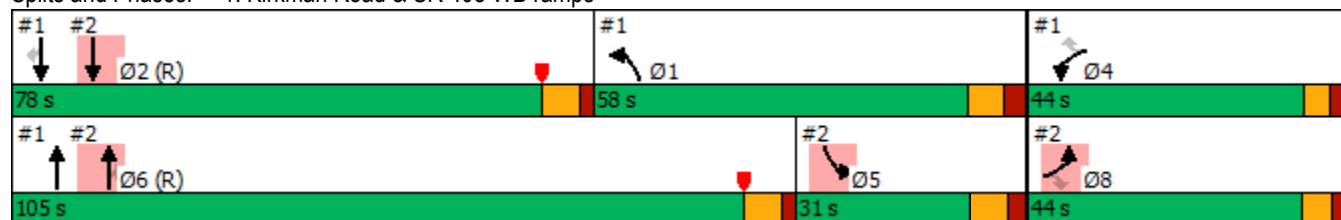
2045 PM _No Build

Intersection Capacity Utilization 69.8%

ICU Level of Service C




















Analysis Period (min) 15

Splits and Phases: 1: Kirkman Road & SR 408 WB ramps



Lanes, Volumes, Timings
2: Kirkman Road & SR 408 EB Ramps

2045 PM _No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	0	270	0	0	0	0	1490	530	110	1420	0
Future Volume (vph)	280	0	270	0	0	0	0	1490	530	110	1420	0
Satd. Flow (prot)	3467	0	1599	0	0	0	0	6471	1599	1787	5136	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	3467	0	1599	0	0	0	0	6471	1599	1787	5136	0
Satd. Flow (RTOR)			284						558			
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	295	0	284	0	0	0	0	1568	558	116	1495	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	295	0	284	0	0	0	0	1568	558	116	1495	0
Turn Type	Prot		Perm					NA	Perm	Prot	NA	
Protected Phases	8							6		5	2	
Permitted Phases			8						6			
Total Split (s)	44.0		44.0					105.0	105.0	31.0	78.0	
Total Lost Time (s)	7.2		7.2					6.9	6.9	7.6	7.0	
Act Effct Green (s)	29.2		29.2					113.3	113.3	15.9	86.2	
Actuated g/C Ratio	0.16		0.16					0.63	0.63	0.09	0.48	
v/c Ratio	0.53		0.57					0.39	0.46	0.74	0.61	
Control Delay	71.9		10.7					17.6	2.6	111.7	15.7	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.1	
Total Delay	71.9		10.7					17.6	2.6	111.7	15.8	
LOS	E		B					B	A	F	B	
Approach Delay		41.9						13.6			22.7	
Approach LOS		D						B			C	
Queue Length 50th (ft)	167		0					252	0	145	549	
Queue Length 95th (ft)	209		88					337	56	220	513	
Internal Link Dist (ft)		1655			142			1141			446	
Turn Bay Length (ft)	300		300						250			
Base Capacity (vph)	708		552					4071	1213	232	2458	
Starvation Cap Reductn	0		0					0	0	0	180	
Spillback Cap Reductn	0		0					86	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.42		0.51					0.39	0.46	0.50	0.66	
Intersection Summary												
Cycle Length: 180												
Actuated Cycle Length: 180												
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.78												
Intersection Signal Delay: 20.8												
Intersection LOS: C												

Lane Group	Ø1	Ø4
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Satd. Flow (RTOR)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Bus Blockages (#/hr)		
Parking (#/hr)		
Mid-Block Traffic (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	1	4
Permitted Phases		
Total Split (s)	58.0	44.0
Total Lost Time (s)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings 2: Kirkman Road & SR 408 EB Ramps

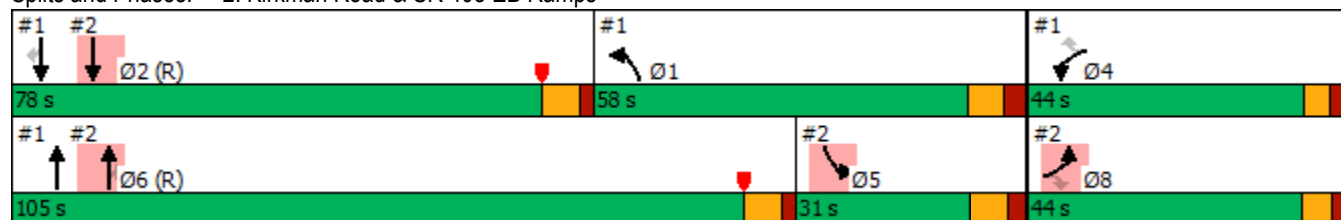
2045 PM _No Build

Intersection Capacity Utilization 69.8%

ICU Level of Service C













Analysis Period (min) 15

Splits and Phases: 2: Kirkman Road & SR 408 EB Ramps












Lanes, Volumes, Timings
3: Pine Hills Road & SR 408 WB ramps

2045 PM _No Build

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (vph)	70	460	810	0	0	1010
Future Volume (vph)	70	460	810	0	0	1010
Satd. Flow (prot)	1787	1599	3574	0	0	3574
Flt Permitted	0.950					
Satd. Flow (perm)	1787	1599	3574	0	0	3574
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	74	484	853	0	0	1063
Shared Lane Traffic (%)						
Lane Group Flow (vph)	74	484	853	0	0	1063
Sign Control	Stop		Free			Free
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 57.5%				ICU Level of Service B		
Analysis Period (min) 15						

Lanes, Volumes, Timings
4: Pine Hills Road & SR 408 EB Ramps

2045 PM _No Build

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	810	210	250	830
Future Volume (vph)	0	0	810	210	250	830
Satd. Flow (prot)	0	0	3463	0	1787	3574
Flt Permitted					0.950	
Satd. Flow (perm)	0	0	3463	0	1787	3574
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	0	0	853	221	263	874
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1074	0	263	874
Sign Control	Stop		Free			Free
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 57.5%				ICU Level of Service B		
Analysis Period (min) 15						

Lanes, Volumes, Timings
5: SR 408 WB ramps & Old Winter Garden Road

2045 PM _No Build

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↖	↗
Traffic Volume (vph)	800	0	0	1190	270	70
Future Volume (vph)	800	0	0	1190	270	70
Satd. Flow (prot)	3574	0	0	3574	1787	1599
Flt Permitted					0.950	
Satd. Flow (perm)	3574	0	0	3574	1787	1599
Satd. Flow (RTOR)						74
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	842	0	0	1253	284	74
Shared Lane Traffic (%)						
Lane Group Flow (vph)	842	0	0	1253	284	74
Turn Type	NA			NA	Prot	Perm
Protected Phases	6			2	4	
Permitted Phases						4
Total Split (s)	95.0			95.0	55.0	55.0
Total Lost Time (s)	6.8			6.8	5.9	5.9
Act Effect Green (s)	107.8			107.8	29.5	29.5
Actuated g/C Ratio	0.72			0.72	0.20	0.20
v/c Ratio	0.33			0.49	0.81	0.20
Control Delay	8.8			10.6	74.7	10.2
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	8.8			10.6	74.7	10.2
LOS	A			B	E	B
Approach Delay	8.8			10.6	61.4	
Approach LOS	A			B	E	
Queue Length 50th (ft)	145			255	269	0
Queue Length 95th (ft)	218			372	352	42
Internal Link Dist (ft)	887			1119	1696	
Turn Bay Length (ft)					1000	
Base Capacity (vph)	2568			2568	584	573
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.33			0.49	0.49	0.13
Intersection Summary						
Cycle Length: 150						
Actuated Cycle Length: 150						
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.81						
Intersection Signal Delay: 17.4				Intersection LOS: B		

Lanes, Volumes, Timings
5: SR 408 WB ramps & Old Winter Garden Road

2045 PM _No Build

Intersection Capacity Utilization 58.4%

ICU Level of Service B
























Analysis Period (min) 15

Splits and Phases: 5: SR 408 WB ramps & Old Winter Garden Road



Lanes, Volumes, Timings
6: John Young Parkway & SR 408 WB ramps

2045 PM_No Build

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		  			  							 
Traffic Volume (vph)	190	1910	0	0	2250	440	0	0	0	80	0	300
Future Volume (vph)	190	1910	0	0	2250	440	0	0	0	80	0	300
Satd. Flow (prot)	1770	5085	0	0	6408	1583	0	0	0	1770	0	2787
Flt Permitted	0.036									0.950		
Satd. Flow (perm)	67	5085	0	0	6408	1583	0	0	0	1770	0	2787
Satd. Flow (RTOR)						315						75
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	200	2011	0	0	2368	463	0	0	0	84	0	316
Shared Lane Traffic (%)												
Lane Group Flow (vph)	200	2011	0	0	2368	463	0	0	0	84	0	316
Turn Type	pm+pt	NA			NA	Perm				Prot		Perm
Protected Phases	5	2			6					3		
Permitted Phases	2					6						3
Total Split (s)	41.0	144.0			103.0	103.0				36.0		36.0
Total Lost Time (s)	7.7	7.7			7.7	7.7				5.7		5.7
Act Effct Green (s)	145.3	145.3			104.3	104.3				21.3		21.3
Actuated g/C Ratio	0.81	0.81			0.58	0.58				0.12		0.12
v/c Ratio	0.54	0.49			0.64	0.44				0.40		0.80
Control Delay	18.4	3.0			26.7	7.9				78.0		73.7
Queue Delay	0.0	0.4			0.0	0.0				0.0		0.0
Total Delay	18.4	3.4			26.7	7.9				78.0		73.7
LOS	B	A			C	A				E		E
Approach Delay		4.7			23.6						74.6	
Approach LOS		A			C						E	
Queue Length 50th (ft)	153	99			528	83				94		161
Queue Length 95th (ft)	m154	106			612	180				150		218
Internal Link Dist (ft)		347			2240			1041			1370	
Turn Bay Length (ft)						250				500		500
Base Capacity (vph)	369	4105			3714	1049				297		531
Starvation Cap Reductn	0	1318			0	0				0		0
Spillback Cap Reductn	0	0			49	0				0		0
Storage Cap Reductn	0	0			0	0				0		0
Reduced v/c Ratio	0.54	0.72			0.65	0.44				0.28		0.60
Intersection Summary												
Cycle Length: 180												
Actuated Cycle Length: 180												
Offset: 113 (63%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.80												
Intersection Signal Delay: 19.7												
Intersection LOS: B												

Lanes, Volumes, Timings 6: John Young Parkway & SR 408 WB ramps

2045 PM _No Build

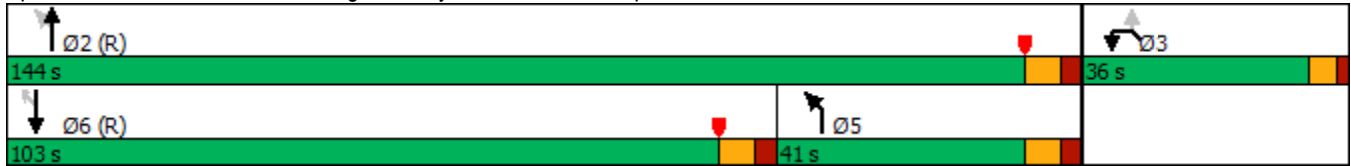
Intersection Capacity Utilization 96.6%

ICU Level of Service F

Analysis Period (min) 15
























m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: John Young Parkway & SR 408 WB ramps



Lanes, Volumes, Timings
7: John Young Parkway & SR 408 EB Ramps

2045 PM_No Build

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 							  			  	
Traffic Volume (vph)	200	0	150	0	0	0	0	1900	220	660	1670	0
Future Volume (vph)	200	0	150	0	0	0	0	1900	220	660	1670	0
Satd. Flow (prot)	3433	0	1583	0	0	0	0	5085	1583	1770	5085	0
Flt Permitted	0.950									0.047		
Satd. Flow (perm)	3433	0	1583	0	0	0	0	5085	1583	88	5085	0
Satd. Flow (RTOR)			68						122			
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	211	0	158	0	0	0	0	2000	232	695	1758	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	211	0	158	0	0	0	0	2000	232	695	1758	0
Turn Type	Prot		Perm					NA	Perm	pm+pt	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4						2	6		
Total Split (s)	21.0		21.0					84.0	84.0	75.0	159.0	
Total Lost Time (s)	6.8		6.8					7.1	7.1	7.1	7.1	
Act Effct Green (s)	13.8		13.8					77.8	77.8	152.3	152.3	
Actuated g/C Ratio	0.08		0.08					0.43	0.43	0.85	0.85	
v/c Ratio	0.80		0.86					0.91	0.31	0.99	0.41	
Control Delay	103.4		82.8					55.2	16.5	57.9	0.5	
Queue Delay	0.0		0.0					0.0	0.0	4.4	0.1	
Total Delay	103.4		82.8					55.2	16.5	62.3	0.6	
LOS	F		F					E	B	E	A	
Approach Delay		94.6						51.2			18.1	
Approach LOS		F						D			B	
Queue Length 50th (ft)	128		108					814	81	235	13	
Queue Length 95th (ft)	#189		#244					880	151	#512	7	
Internal Link Dist (ft)		1163			951			1113			347	
Turn Bay Length (ft)	450								250			
Base Capacity (vph)	270		187					2196	753	708	4301	
Starvation Cap Reductn	0		0					0	0	14	1089	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.78		0.84					0.91	0.31	1.00	0.55	
Intersection Summary												
Cycle Length: 180												
Actuated Cycle Length: 180												
Offset: 148 (82%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.99												
Intersection Signal Delay: 38.3						Intersection LOS: D						

Lanes, Volumes, Timings 7: John Young Parkway & SR 408 EB Ramps

2045 PM _No Build

Intersection Capacity Utilization 96.6%

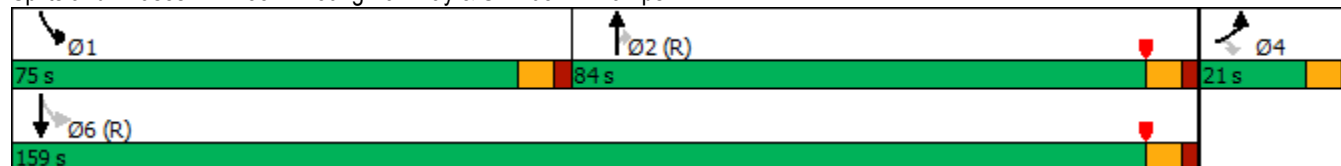
ICU Level of Service F

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 7: John Young Parkway & SR 408 EB Ramps



Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	5:00	5:00	5:00	5:00	5:00	5:00	5:00
End Time	7:30	7:30	7:30	7:30	7:30	7:30	7:30
Total Time (min)	150	150	150	150	150	150	150
Time Recorded (min)	120	120	120	120	120	120	120
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	30320	30509	30498	30394	30179	30517	30277
Vehs Exited	30285	30443	30497	30353	30163	30449	30282
Starting Vehs	430	357	458	443	418	409	408
Ending Vehs	465	423	459	484	434	477	403
Denied Entry Before	4	0	3	3	4	3	3
Denied Entry After	3	4	3	2	4	4	4
Travel Distance (mi)	16332	16459	16456	16381	16306	16403	16303
Travel Time (hr)	941.9	895.6	949.7	963.3	906.9	965.5	839.4
Total Delay (hr)	453.9	403.9	458.2	473.9	419.9	475.2	352.1
Total Stops	23048	21499	23001	23729	21997	22703	19471
Fuel Used (gal)	610.6	599.0	616.7	618.7	598.7	618.8	578.0

Summary of All Intervals

Run Number	8	9	10	Avg
Start Time	5:00	5:00	5:00	5:00
End Time	7:30	7:30	7:30	7:30
Total Time (min)	150	150	150	150
Time Recorded (min)	120	120	120	120
# of Intervals	2	2	2	2
# of Recorded Intervals	1	1	1	1
Vehs Entered	30255	30410	30646	30401
Vehs Exited	30193	30429	30612	30371
Starting Vehs	428	417	441	421
Ending Vehs	490	398	475	449
Denied Entry Before	3	4	3	0
Denied Entry After	3	7	3	0
Travel Distance (mi)	16340	16376	16488	16384
Travel Time (hr)	923.4	939.3	881.3	920.6
Total Delay (hr)	435.1	450.3	387.8	431.0
Total Stops	22497	22868	20848	22165
Fuel Used (gal)	602.3	612.5	593.0	604.8

Interval #0 Information Seeding

Start Time	5:00
End Time	5:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	5:30
End Time	7:30
Total Time (min)	120

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	6	7
Vehs Entered	30320	30509	30498	30394	30179	30517	30277
Vehs Exited	30285	30443	30497	30353	30163	30449	30282
Starting Vehs	430	357	458	443	418	409	408
Ending Vehs	465	423	459	484	434	477	403
Denied Entry Before	4	0	3	3	4	3	3
Denied Entry After	3	4	3	2	4	4	4
Travel Distance (mi)	16332	16459	16456	16381	16306	16403	16303
Travel Time (hr)	941.9	895.6	949.7	963.3	906.9	965.5	839.4
Total Delay (hr)	453.9	403.9	458.2	473.9	419.9	475.2	352.1
Total Stops	23048	21499	23001	23729	21997	22703	19471
Fuel Used (gal)	610.6	599.0	616.7	618.7	598.7	618.8	578.0

Interval #1 Information Recording

Start Time	5:30
End Time	7:30
Total Time (min)	120

Volumes adjusted by Growth Factors.

Run Number	8	9	10	Avg
Vehs Entered	30255	30410	30646	30401
Vehs Exited	30193	30429	30612	30371
Starting Vehs	428	417	441	421
Ending Vehs	490	398	475	449
Denied Entry Before	3	4	3	0
Denied Entry After	3	7	3	0
Travel Distance (mi)	16340	16376	16488	16384
Travel Time (hr)	923.4	939.3	881.3	920.6
Total Delay (hr)	435.1	450.3	387.8	431.0
Total Stops	22497	22868	20848	22165
Fuel Used (gal)	602.3	612.5	593.0	604.8

1: Kirkman Road & SR 408 WB ramps Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.3	0.5	0.0	0.0	0.2	0.5	1.4
Denied Del/Veh (s)	1.1	3.0	0.0	0.0	0.3	2.3	0.6
Total Delay (hr)	16.7	3.1	9.2	8.9	20.7	0.9	59.5
Total Del/Veh (s)	69.4	18.8	56.6	10.8	33.9	4.4	26.9
Travel Time (hr)	24.1	8.8	11.1	16.4	28.9	4.8	94.1
Avg Speed (mph)	7	14	5	18	12	27	12
Vehicles Entered	853	587	573	2959	2192	758	7922
Vehicles Exited	852	588	575	2959	2192	758	7924
Hourly Exit Rate	426	294	288	1480	1096	379	3962
Input Volume	420	290	290	1480	1110	380	3970
% of Volume	101	101	99	100	99	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

2: Kirkman Road & SR 408 EB Ramps Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.1	0.4	0.6	0.6	0.0	0.0	1.7
Denied Del/Veh (s)	0.7	2.5	0.7	2.1	0.0	0.0	0.7
Total Delay (hr)	10.4	2.5	15.2	1.4	4.5	12.1	46.1
Total Del/Veh (s)	65.9	16.9	18.4	4.7	75.7	15.3	20.2
Travel Time (hr)	16.6	9.1	30.9	8.5	5.1	19.9	90.3
Avg Speed (mph)	11	20	22	29	4	15	18
Vehicles Entered	554	538	2974	1057	206	2838	8167
Vehicles Exited	557	538	2975	1057	206	2838	8171
Hourly Exit Rate	279	269	1488	529	103	1419	4086
Input Volume	280	270	1490	530	110	1420	4100
% of Volume	99	100	100	100	94	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

3: Pine Hills Road & SR 408 WB ramps Performance by movement

Movement	WBL	WBR	NBT	SBT	All
Denied Delay (hr)	0.1	0.1	0.0	0.1	0.4
Denied Del/Veh (s)	2.7	0.5	0.0	0.3	0.3
Total Delay (hr)	4.2	2.6	0.3	0.3	7.4
Total Del/Veh (s)	110.3	10.0	0.7	0.5	5.6
Travel Time (hr)	5.3	10.0	2.4	7.0	24.7
Avg Speed (mph)	6	20	35	33	22
Vehicles Entered	135	923	1632	2026	4716
Vehicles Exited	136	922	1632	2026	4716
Hourly Exit Rate	68	461	816	1013	2358
Input Volume	70	460	810	1010	2350
% of Volume	97	100	101	100	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

4: Pine Hills Road & SR 408 EB Ramps Performance by movement

Movement	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.1	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.2	0.3	0.0	0.0	0.1
Total Delay (hr)	0.7	0.2	1.7	0.1	2.6
Total Del/Veh (s)	1.4	1.6	12.2	0.2	2.2
Travel Time (hr)	8.6	2.7	2.7	2.6	16.7
Avg Speed (mph)	37	30	10	34	31
Vehicles Entered	1633	416	495	1667	4211
Vehicles Exited	1632	415	494	1668	4209
Hourly Exit Rate	816	208	247	834	2105
Input Volume	810	210	250	830	2100
% of Volume	101	99	99	100	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

5: SR 408 WB ramps & Old Winter Garden Road Performance by movement

Movement	EBT	WBT	NBL	NBR	All
Denied Delay (hr)	0.1	0.1	0.3	0.0	0.5
Denied Del/Veh (s)	0.1	0.2	2.0	0.5	0.4
Total Delay (hr)	3.9	7.0	9.0	0.3	20.1
Total Del/Veh (s)	8.7	10.5	58.1	6.4	15.4
Travel Time (hr)	10.4	18.9	16.7	2.2	48.2
Avg Speed (mph)	28	28	11	21	22
Vehicles Entered	1598	2377	549	140	4664
Vehicles Exited	1597	2378	549	140	4664
Hourly Exit Rate	799	1189	275	70	2332
Input Volume	800	1190	270	70	2330
% of Volume	100	100	102	100	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

6: John Young Parkway & SR 408 WB ramps Performance by movement

Movement	NBL	NBT	SBT	SBR	NWL	NWR	All
Denied Delay (hr)	0.0	0.0	3.5	0.8	0.1	0.1	4.5
Denied Del/Veh (s)	0.0	0.0	2.8	3.2	3.2	0.5	1.6
Total Delay (hr)	2.6	8.8	113.0	2.9	3.6	4.0	134.8
Total Del/Veh (s)	25.2	8.3	88.6	11.6	82.5	23.6	46.5
Travel Time (hr)	3.7	16.6	159.3	11.5	5.2	10.0	206.2
Avg Speed (mph)	8	19	12	32	8	16	14
Vehicles Entered	370	3812	4511	884	156	602	10335
Vehicles Exited	370	3813	4485	882	156	601	10307
Hourly Exit Rate	185	1907	2243	441	78	301	5154
Input Volume	190	1910	2250	440	80	300	5170
% of Volume	97	100	100	100	98	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

7: John Young Parkway & SR 408 EB Ramps Performance by movement

Movement	EBL	EBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.4	0.1	0.3	0.2	0.1	0.0	1.2
Denied Del/Veh (s)	3.6	0.7	0.3	1.9	0.3	0.0	0.4
Total Delay (hr)	15.9	2.5	77.1	2.9	22.5	3.5	124.3
Total Del/Veh (s)	141.8	29.8	72.6	23.1	61.5	3.8	46.4
Travel Time (hr)	18.7	4.5	95.5	5.4	26.6	10.6	161.3
Avg Speed (mph)	5	15	8	17	4	29	9
Vehicles Entered	399	298	3789	450	1304	3339	9579
Vehicles Exited	399	298	3784	450	1303	3339	9573
Hourly Exit Rate	200	149	1892	225	652	1670	4787
Input Volume	200	150	1900	220	660	1671	4801
% of Volume	100	99	100	102	99	100	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Denied Delay (hr)	9.7
Denied Del/Veh (s)	1.2
Total Delay (hr)	421.3
Total Del/Veh (s)	49.2
Travel Time (hr)	920.6
Avg Speed (mph)	18
Vehicles Entered	30401
Vehicles Exited	30371
Hourly Exit Rate	15186
Input Volume	41331
% of Volume	37
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Kirkman Road & SR 408 WB ramps

Movement	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	T	T
Maximum Queue (ft)	336	366	247	449	210	237	253	476	438	334
Average Queue (ft)	200	231	100	261	74	98	101	295	246	142
95th Queue (ft)	292	325	186	398	153	198	218	430	389	285
Link Distance (ft)		1064		448	448	448	448	862	862	862
Upstream Blk Time (%)				0	0					
Queuing Penalty (veh)				2	0					
Storage Bay Dist (ft)	400		400							
Storage Blk Time (%)	0	0								0
Queuing Penalty (veh)	0	0								0

Intersection: 2: Kirkman Road & SR 408 EB Ramps

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	T	T	T	T	L	T	T	T
Maximum Queue (ft)	233	258	229	288	339	312	252	215	296	354	352
Average Queue (ft)	122	147	89	94	181	158	93	106	103	138	152
95th Queue (ft)	197	214	163	204	307	283	210	182	214	288	322
Link Distance (ft)		1674			1184	1184	1184	448	448	448	448
Upstream Blk Time (%)										0	0
Queuing Penalty (veh)										0	0
Storage Bay Dist (ft)	300		300	400							
Storage Blk Time (%)	0	0					0				
Queuing Penalty (veh)	0	0					0				

Intersection: 3: Pine Hills Road & SR 408 WB ramps

Movement	WB	WB	SB
Directions Served	L	R	T
Maximum Queue (ft)	206	225	14
Average Queue (ft)	79	93	0
95th Queue (ft)	166	157	12
Link Distance (ft)		1124	588
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	350		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Pine Hills Road & SR 408 EB Ramps

Movement	NB	NB	SB
Directions Served	T	TR	L
Maximum Queue (ft)	11	49	178
Average Queue (ft)	0	7	71
95th Queue (ft)	4	26	125
Link Distance (ft)	1006	1006	225
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: SR 408 WB ramps & Old Winter Garden Road

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	T	T	T	L	R
Maximum Queue (ft)	243	203	333	317	428	80
Average Queue (ft)	113	66	148	131	222	31
95th Queue (ft)	190	151	251	242	347	60
Link Distance (ft)	946	946	1165	1165		1730
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					1000	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: John Young Parkway & SR 408 WB ramps

Movement	NB	NB	NB	NB	SB	SB	SB	SB	SB	NW	NW	NW
Directions Served	L	T	T	T	T	T	T	T	R	L	R	R
Maximum Queue (ft)	238	223	233	242	400	2130	2101	1917	348	181	176	171
Average Queue (ft)	78	69	64	92	387	1400	1202	438	41	77	81	44
95th Queue (ft)	173	149	153	190	456	2569	2267	1362	217	145	145	114
Link Distance (ft)	323	323	323	323		2222	2222	2222			1371	
Upstream Blk Time (%)	0	0	0	0		11	1	0				
Queuing Penalty (veh)	0	0	0	0		0	0	0				
Storage Bay Dist (ft)					350				250	500		500
Storage Blk Time (%)					55	0		4	1			
Queuing Penalty (veh)					310	1		18	4			

Intersection: 7: John Young Parkway & SR 408 EB Ramps

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	T	T	T	R	L	T	T	T
Maximum Queue (ft)	258	285	237	975	927	786	300	361	43	70	70
Average Queue (ft)	135	168	70	630	581	482	177	340	1	2	3
95th Queue (ft)	239	259	151	898	846	718	412	375	17	25	28
Link Distance (ft)			1176	1113	1113	1113		323	323	323	323
Upstream Blk Time (%)				0				42			
Queuing Penalty (veh)				0				243			
Storage Bay Dist (ft)	450	450					250				
Storage Blk Time (%)						31	0				
Queuing Penalty (veh)						68	1				

Intersection: 27: Bend

Movement	WB
Directions Served	T
Maximum Queue (ft)	309
Average Queue (ft)	9
95th Queue (ft)	117
Link Distance (ft)	508
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 28: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	164	68
Average Queue (ft)	9	2
95th Queue (ft)	61	21
Link Distance (ft)	115	115
Upstream Blk Time (%)	0	0
Queuing Penalty (veh)	1	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 650