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Subject: Project Traffic Analysis Memorandum

SR 528 and Dallas Boulevard Interchange PD&E Study (Project # 528-307)

1.0 Overview

1.1 Background

In Summer 2022, the Central Florida Expressway Authority (CFX) initiated a Project Development and Environment (PD&E) study for the SR 528 and Dallas Boulevard interchange. SR 528 currently intersects with Dallas Boulevard forming a partial interchange, serving movements to and from the west only. It was constructed in standard diamond configuration and has not been substantially modified since its opening. The interchange is located within a projected high growth area of eastern Orange County. It is anticipated that future traffic demand at this location will further exceed the design capacities as development in the area continues to intensify. Therefore, the current SR 528 and Dallas Boulevard interchange PD&E study is evaluating addition of ramps to/from east and improving the ramp terminal intersections. Addition of ramps to/from the east will provide more efficient access points to better serve trips originating or ending in the Wedgefield residential area, as well as other planned developments along SR 528 near the interchange of Dallas Boulevard. Figure 1.1 is a map of the Dallas Boulevard interchange location in the regional context.

This Project Traffic Analysis Memorandum is prepared to support the PD&E study. It provides existing conditions data, future traffic forecasts, and operational analysis results for the 2022 existing, 2030 opening and 2050 design year conditions. Historical crash data analysis is also included.

1.2 Analysis Area of Influence

The analysis Area of Influence (AOI) for the proposed interchange is depicted on **Figure 1.2**. It includes the following existing facilities:

- SR 528 mainline segments from Innovation Way to SR 520 and interchanges at:
 - Innovation Way ramps to/from east only
 - o Dallas Boulevard
 - o SR 520
- Dallas Boulevard intersections at:
 - SR 528 Eastbound Off-ramp
 - o SR 528 Westbound On-ramp
 - Starry Street



For Build conditions, the analysis also included a full interchange at SR 528 and Dallas Boulevard with four ramps serving all movements.

Figure 1.1

Project Location

Christmas 50

Wedgefield

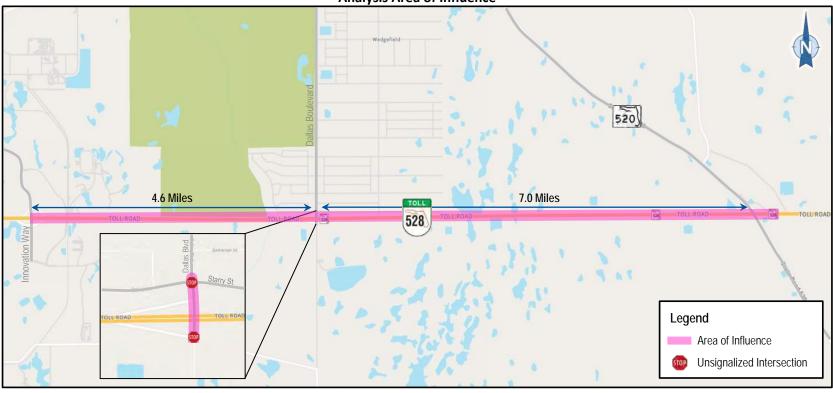
Legend

Dallas Mainline Toll Plaza

→ Proposed Interchange Modification



Figure 1.2
Analysis Area of Influence





1.3 Operational Analysis Methodology

The analysis documented in this memorandum was conducted for the 2022 existing, 2030 opening and 2050 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 targets were adjusted for local conditions such as speed, truck proportion and Peak Hour Factor (PHF).

The Highway Capacity Software (HCS) Version 7.9.6 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 LOS Criteria

LOS	Basic (HCM Exhibit 12-15)	Merge and Diverge (HCM Exhibit 14-3)
Α	≤11	≤10
В	>11–18	>10-20
С	>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 528 to determine a factor for adjusting capacity and speed:

- SR 528 Future Free-Flow Speed (FFS) = 75 mph
- SR 528 Design Hour Truck (DHT) percentage = 3%
- 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 0.980 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. 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
Signalized Intersection 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 than HCM because of these additional refinements.

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

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

^{*}For approach-based and intersection wide assessments, LOS is defined solely by control delay.



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

Control Delay	LOS by Volume-to-Capacity Ratio								
(s/veh)	≤1.0	>1.0							
(HCM Exhibit 20-2)									
0–10	A	F							
>10-15	В	F							
>15–25	С	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 528 is an east-west, limited-access tolled facility that begins at Interstate 4 (I-4) to the west and ends at US 1 to the east in Cocoa. This facility is owned and maintained by the Florida's Turnpike Enterprise (FTE), CFX and FDOT District 5. The section within the project limits is owned and operated by CFX. SR 528 provides a crucial connection for residents and visitors traveling to the International Drive attractions, Orlando International Airport, the east coast beaches, and Cape Canaveral. It also connects the John F. Kennedy Space Center and the aerospace industry with greater Orlando.

The existing typical section of SR 528 is a four-lane divided roadway with a median width of 40 feet within the study limits. Both the eastbound and westbound directions consist of two 12-foot-wide travel lanes, a 4-foot-wide inside shoulder, and 10-foot-wide outside shoulder. The posted speed limit within the study area is 70 mph. SR 528 forms a diamond interchange including a loop ramp with Innovation Way, a partial diamond interchange with Dallas Boulevard and a diamond interchange with SR 520.

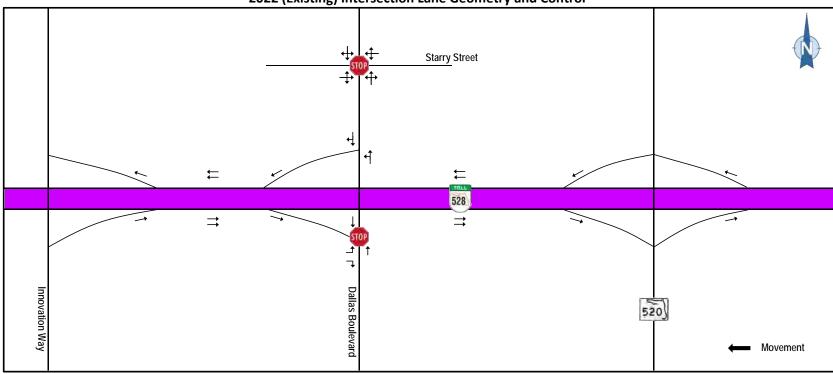
Dallas Boulevard is a north-south, two-lane undivided major collector which serves the Wedgefield residential area. It has a direct access to SR 528 at Milepost (MP) 24, forming a partial interchange with unsignalized ramp terminal intersections that provide access to/from the west only. There is an adjacent closely spaced unsignalized intersection along Dallas Boulevard at Starry Street. The posted speed limit within the study area is 40 mph.

Starry Street is an east-west, two-lane undivided road that serves residential land uses. It forms a four-legged, all-way stop-controlled intersection with Dallas Boulevard. The posted speed limit is 30 mph within the study area.

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



Figure 2.1
2022 (Existing) Intersection Lane Geometry and Control





2.2 Data Collection

Traffic data collection for the project included 48-hour directional counts at two locations and 4-hour intersection counts at three locations. The count locations are listed in **Tables 2.1** and **2.2**. All the counts were conducted in December 2022. Traffic volumes for SR 528 at the Dallas mainline plaza and tolled ramps at Innovation Way and Dallas Boulevard were obtained from transaction data for 2022. Traffic data for the SR 520 tolled ramps was obtained from FTE's transaction data and non-tolled ramps from roadway sensor data for 2022. Supplemental traffic data was obtained from the 2021 CFX Traffic Data and Statistics Manual and the FDOT Florida Traffic Online (FTO) web application for verification purposes. 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.

Table 2.1 2-Day Bi-directional Hose Counts

Count #	Roadway	Count Location	Count Date		
1	Dallas Boulevard	North of Starry Street	12/6-7/2022		
2	SR 520	North of SR 528	12/6-7/2022		

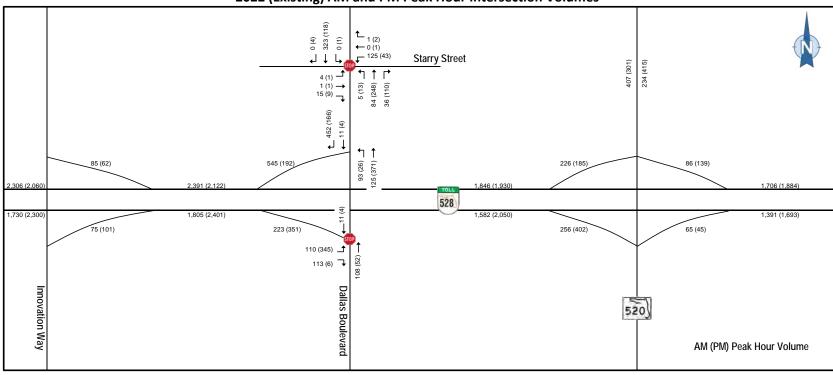
Table 2.2 Intersection Counts

Count #	Intersection Control	Count Location	Count Date
1	Unsignalized	Dallas Boulevard at SR 528 Eastbound Off- Ramp	12/6/2022
2	Unsignalized	Dallas Boulevard at SR 528 Westbound On- Ramp	12/6/2022
3	Unsignalized	Dallas Boulevard at Starry Street	12/6/2022

The 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. Seasonal and axle adjustment factors were applied to the data where applicable. The data were then aggregated and balanced to ensure continuity of flow and consistency. **Figure 2.2** shows the final 2022 existing year peak hour volumes in the AM and PM conditions within the AOI.



Figure 2.2 2022 (Existing) AM and PM Peak Hour Intersection Volumes





2.3 Existing 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**.

2.3.1 Freeway Segments Analysis

The section of SR 528 within the AOI was evaluated using HCS software Version 7.9.6. As shown in **Table 2.3**, the segments currently operate at an acceptable LOS C or better during both the AM and PM peak hours.

Table 2.3
2022 Existing AM and PM Peak Hour Freeway Segment LOS/Density (pcpmpl)

2022 Existing AM and PM Peak Hour F	Segment			e (vph)		LOS/Density	
Segment	Туре	Lanes	AM	PM	AM	PM	
SR 528 Eastbound							
Upstream of Innovation Way on-ramp	Basic	2	1,730	2,300	B/13	B/17	
Innovation Way on-ramp to Dallas Boulevard off-ramp	Merge	2	1,805	2,401	B/15	C/20	
Innovation Way on-ramp to Dallas Boulevard off-ramp	Basic	2	1,805	2,401	B/13	B/18	
Innovation Way on-ramp to Dallas Boulevard off-ramp	Diverge	2	1,805	2,401	B/14	B/19	
Dallas Boulevard off-ramp to SR 520 off-ramp	Basic	2	1,582	2,050	B/12	B/15	
Dallas Boulevard off-ramp to SR 520 off-ramp	Diverge	2	1,582	2,050	B/17	C/21	
SR 520 off-ramp to on-ramp	Basic	2	1,326	1,648	A/10	B/12	
Downstream of SR 520 on-ramp	Merge	2	1,391	1,693	B/15	B/17	
Downstream of SR 520 on-ramp	Basic	2	1,391	1,693	A/10	B/13	
SR 528 Westbound	•						
Upstream of SR 520 off-ramp	Basic	2	1,706	1,884	B/13	B/14	
Upstream of SR 520 off-ramp	Diverge	2	1,706	1,884	B/18	B/20	
SR 520 off-ramp to on-ramp	Basic	2	1,620	1,745	B/12	B/13	
SR 520 on-ramp to Dallas Boulevard on-ramp	Merge	2	1,846	1,930	B/17	B/18	
SR 520 on-ramp to Dallas Boulevard on-ramp	Basic	2	1,846	1,930	B/14	B/14	
Dallas Boulevard on-ramp to Innovation Way off-ramp	Merge	2	2,391	2,122	C/20	B/18	
Dallas Boulevard on-ramp to Innovation Way off-ramp	Basic	2	2,391	2,122	B/18	B/16	
Dallas Boulevard on-ramp to Innovation Way off-ramp	Diverge	2	2,391	2,122	C/24	C/22	
Downstream of Innovation Way off-ramp	Basic	2	2,306	2,060	B/17	B/15	



2.3.2 Ramp Roadways Analysis

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 2.4**. The results show that the ramps within the AOI have a V/C ratio of 0.3 or less in year 2022.

Table 2.4
2022 Existing AM and PM Peak Hour Ramp Capacity Analysis

Interchange	Pamp	Lance	Volum	e (vph)	Capacity	V,	/C
interchange	Ramp	Lanes	AM	PM	(vph)	AM PM 50 0.0 0.0 50 0.0 0.1 50 0.3 0.1 50 0.1 0.2 50 0.1 0.1 50 0.1 0.2	PM
Innovation Way	Westbound off-ramp	1	85	62	1,850	0.0	0.0
Innovation Way	Eastbound on-ramp	1	75	101	1,850	0.0	0.1
Dallas Boulevard	Westbound on-ramp	1	545	192	1,850	0.3	0.1
	Eastbound off-ramp	1	223	351	1,850	0.1	0.2
	Westbound on-ramp	1	226	185	1,850	0.1	0.1
SR 520	Eastbound off-ramp	1	256	402	1,850	0.1	0.2
	Westbound off-ramp	1	86	139	1,850	0.0	0.1
	Eastbound on-ramp	1	65	45	1,850	0.0	0.0

2.3.3 Intersections Analysis

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 2.5**. Detailed Synchro/SimTraffic output reports are provided in **Appendix A**. The results show that all movements are currently operating at an acceptable LOS B or better in both the AM and PM peak hours.



Table 2.5
2022 Existing AM and PM Peak Hour Intersection LOS/Delay (sec)

Intersection	Approach	Movement	LOS	Delay (Seconds)	Maximum Queue Length (Feet)*	Available Storage
			AM (PM)	AM (PM)	AM (PM)	Length (Feet)
		Left	A (B)	9.3 (11.1)	66 (109)	-
	Eastbound	Through	-	-	-	-
		Right	A (B)	9.3 (11.1)	-	720
		Left	-	-	-	-
Dallas	Westbound	Through	-	-	-	-
		Right	-	-	-	-
Dallas Boulevard and SR 528 Eastbound Ramp (Unsignalized) Dallas Boulevard and SR 528 Westbound Ramp (Unsignalized)		Left	-	-	-	-
=	Northbound	Through	A (A)	0.0 (0.0)	-	-
(Unsignalized)		Right	-	-	-	-
		Left	-	-	-	-
	Southbound	Through	A (A)	0.0 (0.0)	-	-
		Right	-	-	-	-
	Overall Int	ersection	A (B)	9.3 (11.1)	-	-
		Left	-	-	-	-
	Eastbound	Through	-	-	-	-
		Right	-	-	-	-
	Westbound	Left	-	-	-	-
		Through	-	-	-	-
		Right	-	-	-	-
		Left	A (A)	0.5 (0.2)	38 (3)	-
-	Northbound	Through	A (A)	3.4 (0.6)	38 (3)	-
Boulevard and SR 528 Westbound Ramp (Unsignalized)		Right	-	-	-	-
		Left	-	-	-	-
	Southbound Company C	Through	A (A)	0.0 (0.0)	-	-
		Right	A (A)	0.0 (0.0)	-	-
	Overall Int	ersection	A (A)	3.4 (0.6)	-	-
		Left	A (A)	8.0 (7.8)	42 (38)	-
	Eastbound	Through	A (A)	8.0 (7.8)	42 (38)	-
		Right	A (A)	8.0 (7.8)	42 (38)	-
		Left	A (A)	9.6 (8.7)	87 (62)	-
Delle -	Westbound	Through	A (A)	0.0 (8.7)	87 (62)	-
Dallas Boulevard and		Right	A (A)	9.6 (8.7)	87 (62)	-
Starry Street		Left	A (B)	8.6 (10.5)	66 (90)	-
(Unsignalized)	Northbound	Through	A (B)	8.6 (10.5)	66 (90)	-
		Right	A (B)	8.6 (10.5)	66 (90)	-
		Left	A (A)	0.0 (8.4)	105 (68)	-
	Southbound	Through	B (A)	11.1 (8.4)	105 (68)	-
		Right	A (A)	0.0 (8.4)	105 (68)	-
	Overall Int	ersection	B (B)	11.1 (10.5)	-	-

^{*}SimTraffic maximum queue length



2.4 Existing Conditions Safety

Crash data for SR 528 mainline and intersections along Dallas Boulevard 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 735 crashes were reported on SR 528 between Innovation Way and SR 520 from 2017 to 2022. There was an increase in the number of crashes from 2017 to 2019 and a reduction from 2020 to 2022, as shown on **Figure 2.3**. The reduction in crashes in 2020 is attributed to COVID-19 impacts which reduced traffic, especially along SR 528 that has a high proportion of tourist traffic. A review of historical data showed that traffic in 2021 was still lower than in 2019 in this section of SR 528. Nevertheless, on average, 123 crashes were reported per year from 2017 to 2022. A review of the hourly crash distribution showed that approximately 24 percent of the crashes occurred between 3 PM and 7 PM. The data indicated that crashes predominantly occurred in the westbound direction.

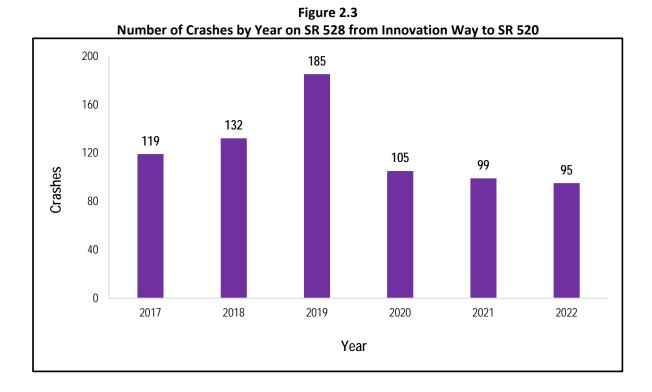


Figure 2.4 summarizes the SR 528 crashes by type, severity, road surface and light conditions. The data showed that the most common types of reported crashes were rear end (36.1 percent), followed by runoff-road (28.0 percent) crashes. A review of the crash reports showed that the contributing factors for rear end and run-off-road crashes were speeding, following too closely and driving while fatigued. Overall, the majority of crashes occurred on dry pavement and during the day. Most of the crashes resulted in property damage only (69.5 percent) but there were a few serious injuries (4.1 percent) and 11 fatalities (1.5 percent). The 11 fatalities reported were mainly due to run-off-road crashes and occurred at night on dry pavement.



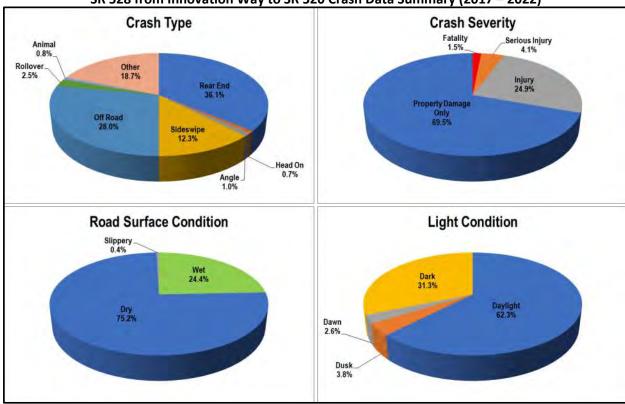


Figure 2.4 SR 528 from Innovation Way to SR 520 Crash Data Summary (2017 – 2022)

Thirteen crashes occurred along Dallas Boulevard within the study limits during the study period from 2017 to 2022: eight at the SR 528 eastbound ramp terminal, two at the SR 528 westbound ramp terminal and three at the Starry Street intersection. Crash analysis at the Dallas Boulevard intersections included a 250-foot influence area. The analysis showed that most of the crashes reported at the intersections were run-off-road, resulted in property damage only and occurred on dry pavement during the day, as illustrated on **Figures 2.5** through **2.7**. A review of the crash reports indicated that all run-off-road crashes involved a single vehicle colliding with a fixed object. There was one fatality at the SR 528 westbound ramp terminal, resulting from a run-off-road crash that occurred on dry pavement at night.



Figure 2.5

Dallas Boulevard and SR 528 Eastbound Ramp Intersection Crash Data Summary (2017 – 2022)

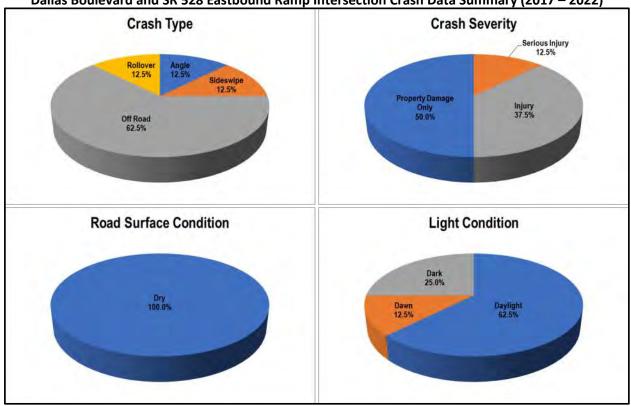
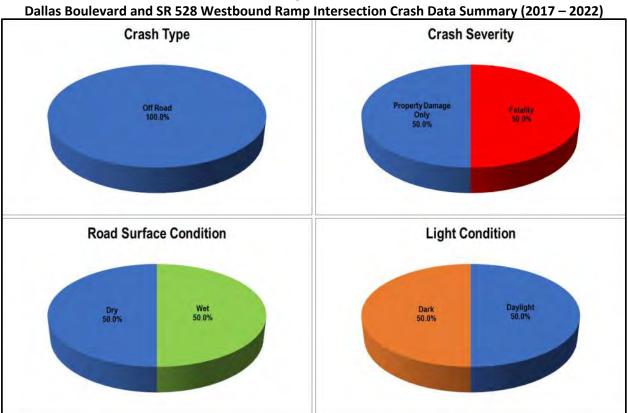
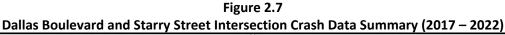


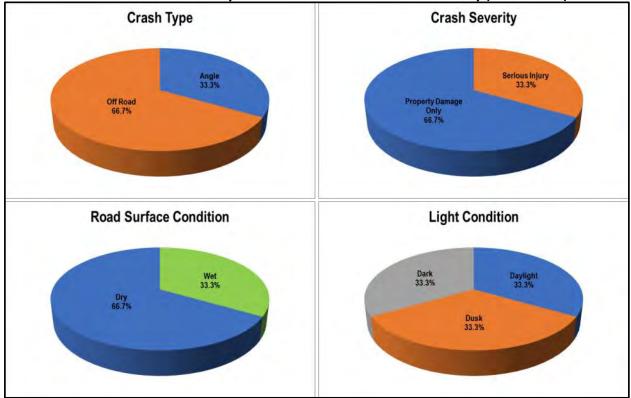
Figure 2.6

Dallas Boulevard and SR 528 Westbound Ramp Intersection Crash Data Summary (2017 – 2022)









Actual crash rates were computed and compared with average crash rates for similar facilities within Orange County to assess the safety condition within the study area. Critical crash rates and safety ratios were also estimated. Crash rates for the SR 528 mainline were estimated as crashes per Million Vehicle Miles Travelled (MVMT) and for the Dallas Boulevard intersections as crashes per Million Entering Vehicles (MEV). 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 or intersection 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 2.6**, the highest safety ratio is 0.70, indicating that this is not necessarily a high crash location.



Table 2.6
Crash Rates and Safety Ratios for 2017 through 2022

Description	Total Crashes			Critical Crash Rate	Safety Ratio
SR 528 Mainline					
Innovation Way to SR 520	735	0.53	0.63	0.75	0.70
Dallas Boulevard Intersection	ons				
SR 528 Eastbound Ramp	8	0.85	0.34	1.73	0.49
SR 528 Westbound Ramp	2	0.16	0.34	1.52	0.11
Starry Street	3	0.20	0.32	1.34	0.15

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

Crash Rate:

Freeway: Toll Road Urban

Freeway: Crashes per Million Vehicle Miles Travelled (MVMT)

Intersection: Urban 2-3Ln 2 Way Undivided

Intersection: Crashes per Million Entering Vehicles (MEV)



3.0 Future Conditions

3.1 Future Annual Average Daily Traffic (AADT)

The CFX Osceola/Brevard County Connector (OBCC) project-specific travel demand model was used as the starting point in projecting future Annual Average Daily Traffic (AADT) for this study. The model was initially prepared for the OBCC Concept, Feasibility & Mobility study and it was originally based on the FDOT District 5 Central Florida Regional Planning Model, version 6.1. The OBCC project-specific model had been validated for 2015 base year and the horizon year was 2045. For the current study, the model was updated to improve distribution and assignment of trips around the Dallas Boulevard and SR 520 interchanges. The traffic analysis zone structure, socioeconomic data and highway network were updated. Model runs were conducted for year 2045 for the No Build alternative with the existing partial interchange at Dallas Boulevard and Build with the proposed full interchange. 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 2045 No Build AADT was adjusted using historical and future master plan growth rates developed for CFX's long range planning. For the ramps to/from east at the SR 520 interchange, reference was made to the FTE's 2022 Traffic Trends Report. To develop the final 2045 No Build AADT profile, additional adjustments were made to balance volumes and ensure continuity of flow. The final 2045 No Build AADT profile was generally used as the basis for developing the Build profile.

Based on the highway network, future land use and initial model output, it was expected that the proposed Dallas Boulevard ramps to/from east would divert traffic from SR 520 and induce new trips due to planned future developments in the area. Proportions for diverted trips were initially estimated using select link analysis from the model. To enhance volume development for the Build alternative, StreetLight origin-destination data was also analyzed to estimate the proportion of trips that would potentially be diverted from the SR 520 interchange ramps to/from east. Final proportions for diverted trips were estimated by comparing the StreetLight data to the select link analysis output, and engineering judgement was applied to ensure reasonableness. These proportions for diverted traffic were applied to the final 2045 No Build AADT profile to develop the Build AADT profile. Further, induced trips were estimated based on the model output and comparison with other ramp volumes in the area to develop the final 2045 Build AADT profile. Since the opening and design years for the project were 2030 and 2050, AADT for these two years was developed through interpolation and extrapolation.

3.2 Traffic Factors

The future traffic factors for this study are presented in **Table 3.1**. The Design Hour Factor (K) is the proportion of the Annual Average Daily Traffic (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.

For future conditions analysis, this study used the standard K factor for the SR 528 and arterials. Consistent with FDOT, CFX has developed standard K factors for use in planning and design applications, based on the FDOT Project Traffic Forecasting Handbook. The D factors were originally calculated using count data and adjusted where applicable based on future projections to account for anticipated changes in land use and traffic patterns.



Existing conditions truck factors were generally maintained for future conditions analysis. The daily truck (T_{24}) factors were obtained from the Florida Traffic Online web application for Telemetered Traffic Monitoring Site (TTMS) 75-9960, located on the SR 528 mainline, west of SR 520, Portable Traffic Monitoring Site (PTMS) 75-2341/2, located at the Dallas mainline toll plaza, and PTMS 75-8220, located on Dallas Boulevard, north of SR 528. The Design Hour Truck (DHT) factor is the proportion of trucks within the peak hour and is assumed to be half of the T_{24} proportion rounded to the nearest whole number for this study. A PHF of 0.95 was assumed for future conditions.

Table 3.1 Future Traffic Factors

Tatale Halle Accord										
Segment		Traffic Factors								
Зевтени	К	D	T ₂₄	DHT						
Freeway Mainline										
SR 528	10.0%	52.0%	6.4%	3.0%						
SR 528 Ramps										
Innovation Way										
Eastbound On-ramp and Westbound Off-ramp	11.1%	56.4%	6.4%	3.0%						
Dallas Boulevard										
Eastbound Off-ramp and Westbound On-ramp	11.0%	67.8%	6.4%	3.0%						
Eastbound On-ramp and Westbound Off-ramp	9.4%	67.3%	6.4%	3.0%						
SR 520										
Eastbound Off-ramp and Westbound On-ramp	9.5%	61.2%	6.4%	3.0%						
Eastbound On-ramp and Westbound Off-ramp	9.5%	65.4%	6.4%	3.0%						
Arterials										
Dallas Boulevard	9.0%	72.6%	4.1%	2.0%						
Starry Street	9.0%	59.5%	4.1%	2.0%						

3.3 Future Directional Design Hour Volumes (DDHV)

Directional Design Hour Volumes (DDHV) for the No Build and Build alternatives for the SR 528 mainline and ramps were generated by applying the K and D traffic factors presented in **Table 3.1** to the final AADT profiles. Adjustments were then made to balance the DDHV to ensure continuity of flow and for reasonableness where applicable. The final SR 528 mainline and ramps AADT and the corresponding DDHV for years 2030 and 2050 are provided in **Tables 3.2** and **3.3** for the No Build and Build conditions, respectively. The bold values represent the mainline volumes, and the non-bold values represent ramp volumes. The data shows that traffic would be diverted from the SR 520 ramps to/from the east of SR 528 to the proposed Dallas Boulevard ramps to/from east and new trips would be induced.

Future year turn movement volumes for the Dallas Boulevard intersections at SR 528 ramp terminals and Starry Street were developed using the projected ramp DDHV. Turn proportions were estimated using peak period data from the model and adjusted based on anticipated changes in land use and traffic patterns where applicable. The projected 2030 and 2050 design hour volumes are presented in **Figures 3.1** through **3.4** for the No Build and Build conditions.



Table 3.2
No Build Traffic Forecasts

				2030					2050				
Location		SR 528		AADT	AM -	DDHV	PM - DDHV		AADT	AM - DDHV		PM - DDHV	
				AADI	EB	WB	EB	WB	AADI	EB	WB	EB	WB
Innovation Way	×		×	75,500 2,400	3,460 110	4,250 150	4,140 150	3,460 110	110,800 3,500	5,080 170	6,150 220	6,070 220	5,080 170
				77,900	3,570	4,400	4,290	3,570	114,300	5,250	6,370	6,290	5,250
Dallas Boulevard	У		X	7,500	260	670	560	260	11,000	390	900	820	390
Dallas Mainline Toll Plaza			•	70,400	3,310	3,730	3,730	3,310	103,300	4,860	5,470	5,470	4,860
SR 520			\rightarrow	9,600	560	360	560	360	14,100	820	520	820	520
	×	 	/	3,900	240	130	130	240	6,900	430	220	220	430
				64,700	2,990	3,500	3,300	3,190	96,100	4,470	5,170	4,870	4,770

Values in purple indicate peak hour directional volumes



Table 3.3
Build Traffic Forecasts

						2030					2050		
Location		SR 528		AADT	AM -	DDHV	PM -	DDHV	AADT	AM -	DDHV	PM -	DDHV
				AADI	EB	WB	EB	WB	AADI	EB	WB	EB	WB
Innovation Way	×		×	75,500 2,400	3,460 110	4,250 150	4,140 150	3,460 110	110,800 3,500	5,080 170	6,150 220	6,070 220	5,080 170
				77,900	3,570	4,400	4,290	3,570	114,300	5,250	6,370	6,290	5,250
Dallas Boulevard	×		>	7,500 2,900	260 160	670 120	560 100	260 180	11,000 5,200	390 330	900 160	820 160	390 330
Dallas Mainline Toll Plaza				73,300	3,470	3,850	3,830	3,490	108,500	5,190	5,630	5,630	5,190
SR 520				9,600 3,100	560 190	360 100	560 100	360 190	14,100 5,500	820 340	520 180	820 180	520 340
				66,800	3,100	3,590	3,370	3,320	99,900	4,710	5,290	4,990	5,010

Values in purple indicate peak hour directional volumes



Figure 3.1 2030 AM (PM) No Build DDHV

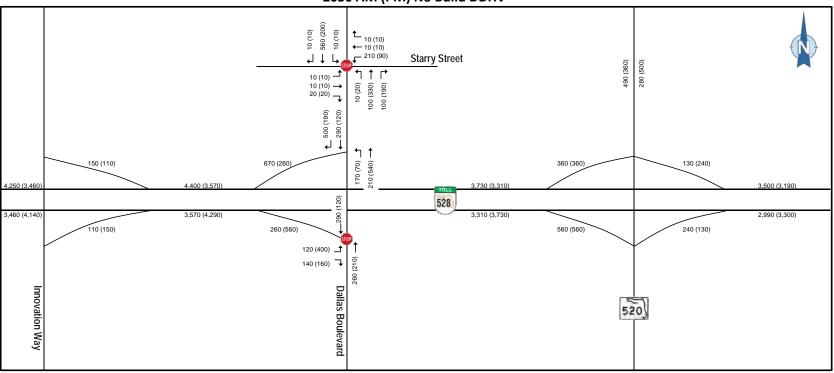




Figure 3.2 2050 AM (PM) No Build DDHV

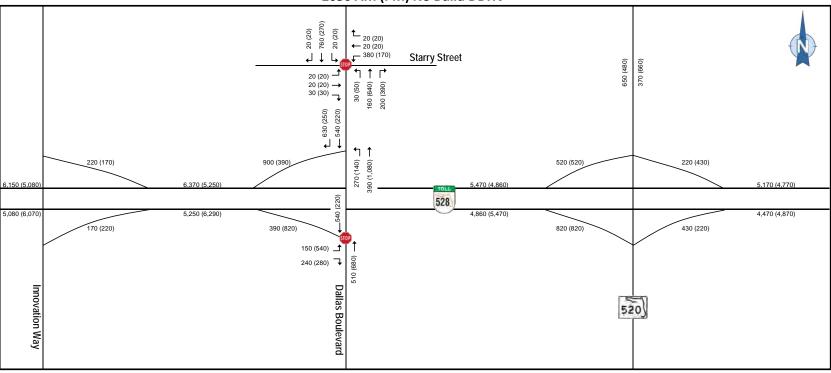




Figure 3.3 2030 AM (PM) Build DDHV

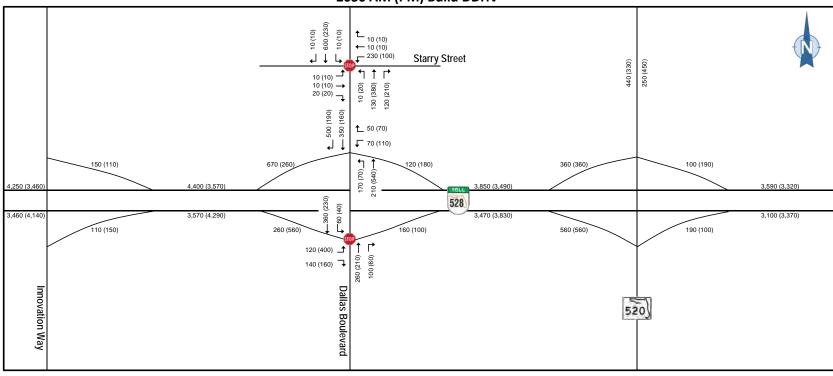
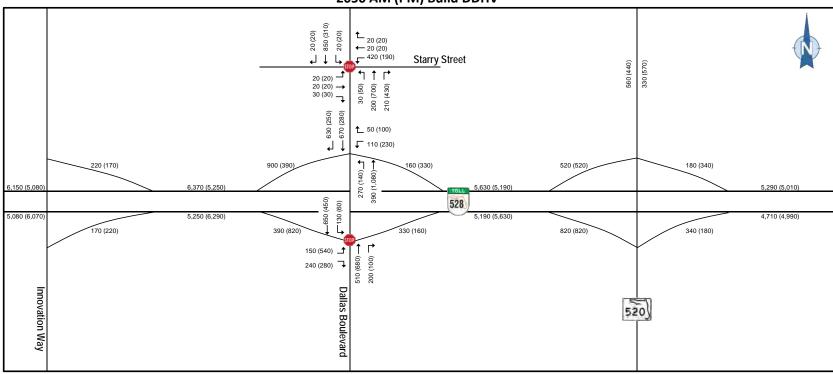




Figure 3.4 2050 AM (PM) Build DDHV





3.4 Lane Requirements for Freeway Mainline and Ramps

Future lane requirements were evaluated to provide an estimated timeline for the onset of capacity deficiencies along the SR 528 mainline and ramp roadways for the No Build and Build alternatives. 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 for the SR 528 mainline and ramps is summarized in **Table 3.4**. The analysis for the mainline segments was based on LOS D constraints. The analysis for ramp roadways was based on LOS E (capacity) target. The analysis shows that the SR 528 mainline will require three lanes per direction from Innovation Way to SR 520 either before or just after year 2030. This is consistent with the planned widening of the SR 528 mainline to three lanes per direction in this area, that is yet to be programmed. The results also show that the segment of SR 528 from Innovation Way to Dallas Boulevard will require four lanes per direction by year 2045. 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 3.5** and **3.6**. The lane requirements evaluation was followed by detailed analysis to confirm future operations and refine the proposed lane geometry where applicable, as documented in the sections that follow.

Table 3.4

Lanes Requirements Summary – Number of Lanes per Direction

2022 Existing Lane Needs (Year) LOS D/E										
Location		SR 528		2022 Existing						
Eocation		JK 320		Number of Lanes	No Build	Build				
Innovation Way	×		×	1	n/a	n/a				
				2	3 (<2030), 4 (2045)	3 (<2030), 4 (2045)				
Dallas Boulevard	×		>	1 n/a	n/a n/a	n/a 1				
Dallas Mainline Toll Plaza				2	3 (2032)	3 (2031)				
SR 520				1	n/a	n/a				
			ľ	1	n/a	n/a				

Year of need based on mainline LOS D Maximum Service Volume/Ramp Capacity (LOS E)

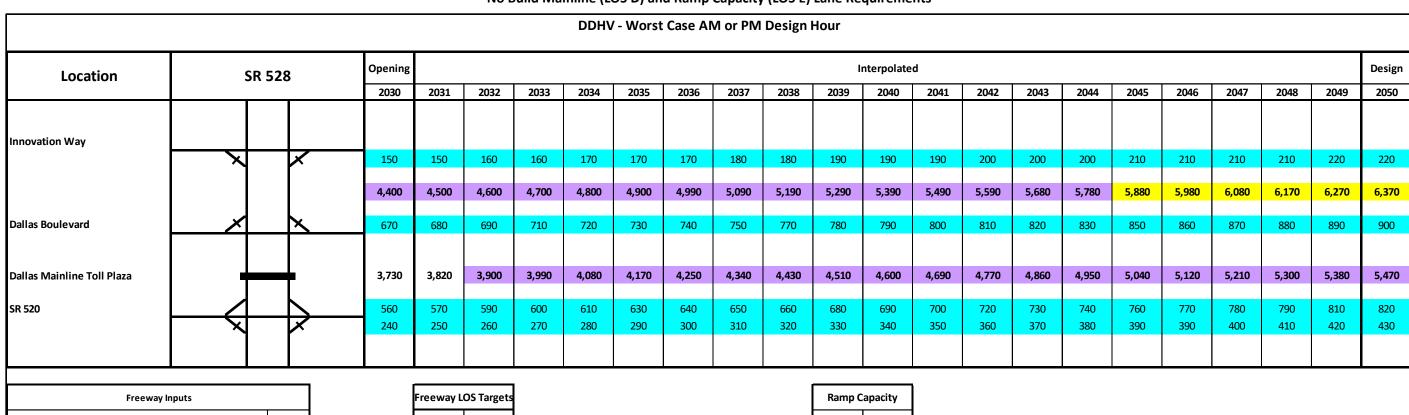
<Before

n/a - not applicable or no additional lane needs



Table 3.5

No Build Mainline (LOS D) and Ramp Capacity (LOS E) Lane Requirements



Freeway Inputs				
Truck % (t _f)	3.0%			
Free Flow Speed (mph)	75			
Peak Hour Factor (PHF)	0.95			

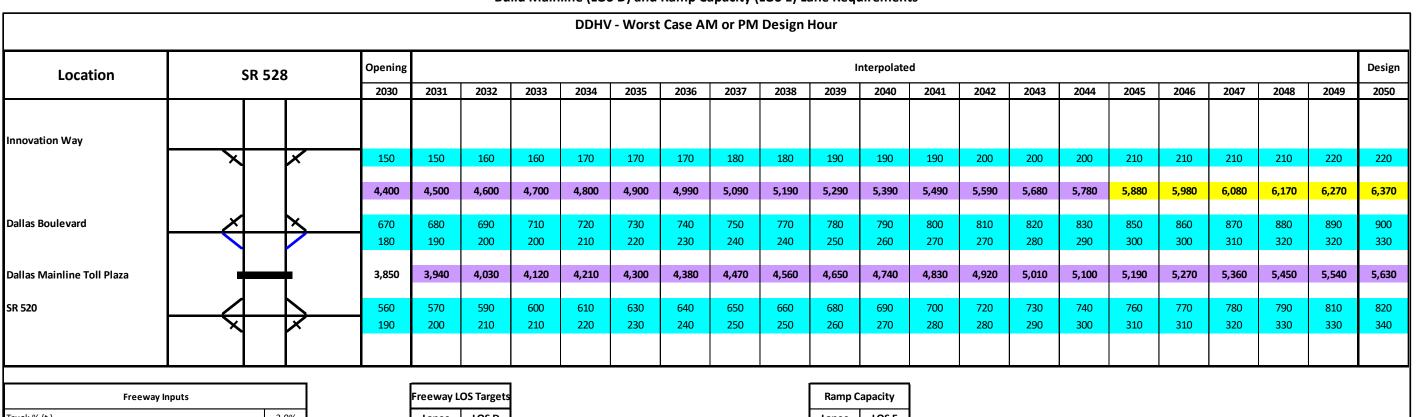
Freeway L	.OS Targets			
Lanes LOS D				
2	3,860			
3	5,790			
4	7,720			
5	9,650			
6	11,580			

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

Speed - 40 to 50 MPH



Table 3.6
Build Mainline (LOS D) and Ramp Capacity (LOS E) Lane Requirements



Freeway Inputs				
Truck % (t _f)	3.0%			
Free Flow Speed (mph)	75			
Peak Hour Factor (PHF)	0.95			

Freeway LOS Targets					
Lanes	LOS D				
2	3,860				
3	5,790				
4	7,720				
5	9,650				
6	11,580				

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

Speed - 40 to 50 MPH



3.5 Freeway Segments Analysis

The future freeway segment analysis considered the planned widening of the SR 528 mainline to three lanes per direction from Innovation Way to SR 520, for both No Build and Build interchange conditions. The 2030 opening year HCS output for the SR 528 mainline segments within the AOI is summarized in **Tables 3.7** and **3.8** for the No Build and Build alternatives, respectively. Detailed output reports and analysis files are provided in **Appendix B**. The results show that the freeway segments are expected to operate at an acceptable LOS D or better in the both the 2030 No Build and Build conditions.

Table 3.7
2030 No Build AM and PM Design Hour Freeway Segment LOS/Density (pcpmpl)

2030 No Build AM and PM Design Hour Freeway Segment LOS/Density (pcpmpl)									
Segment	Segment	Lanes	Volum	e (vph)	LOS/Density				
Segment	Туре	Lanes	AM	PM	AM	PM			
SR 528 Eastbound									
Upstream of Innovation Way on-ramp	Basic	3	3,460	4,140	B/17	C/21			
Innovation Way on-ramp to Dallas Boulevard off-ramp	Merge	3	3,570	4,290	B/18	C/22			
Innovation Way on-ramp to Dallas Boulevard off-ramp	Basic	3	3,570	4,290	B/18	C/22			
Innovation Way on-ramp to Dallas Boulevard off-ramp	Diverge	3	3,570	4,290	B/19	C/24			
Dallas Boulevard off-ramp to SR 520 off-ramp	Basic	3	3,310	3,730	B/16	C/19			
Dallas Boulevard off-ramp to SR 520 off-ramp	Diverge	3	3,310	3,730	C/24	C/26			
SR 520 off-ramp to on-ramp	Basic	3	2,750	3,170	B/14	B/16			
Downstream of SR 520 on-ramp	Merge	3	2,990	3,300	B/19	B/20			
Downstream of SR 520 on-ramp	Basic	3	2,990	3,300	B/15	B/16			
SR 528 Westbound									
Upstream of SR 520 off-ramp	Basic	3	3,500	3,190	B/17	B/16			
Upstream of SR 520 off-ramp	Diverge	3	3,500	3,190	C/24	C/23			
SR 520 off-ramp to on-ramp	Basic	3	3,370	2,950	B/17	B/15			
SR 520 on-ramp to Dallas Boulevard on-ramp	Merge	3	3,730	3,310	C/21	B/19			
SR 520 on-ramp to Dallas Boulevard on-ramp	Basic	3	3,730	3,310	C/19	B/16			
Dallas Boulevard on-ramp to Innovation Way off-ramp	Merge	3	4,400	3,570	C/25	B/19			
Dallas Boulevard on-ramp to Innovation Way off-ramp	Basic	3	4,400	3,570	C/23	B/18			
Dallas Boulevard on-ramp to Innovation Way off-ramp	Diverge	3	4,400	3,570	D/28	C/24			
Downstream of Innovation Way off-ramp	Basic	3	4,250	3,460	C/22	B/17			



Table 3.8
2030 Build AM and PM Design Hour Freeway Segment LOS/Density (pcpmpl)

2030 Bullu Alvi allu Pivi Desigli Houi Pi	Segment		Volum		LOS/Density	
Segment	Туре	Lanes	AM	PM	AM	PM
SR 528 Eastbound						
Upstream of Innovation Way on-ramp	Basic	3	3,460	4,140	B/17	C/21
Innovation Way on-ramp to Dallas Boulevard off-ramp	Merge	3	3,570	4,290	B/18	C/22
Innovation Way on-ramp to Dallas Boulevard off-ramp	Basic	3	3,570	4,290	B/18	C/22
Innovation Way on-ramp to Dallas Boulevard off-ramp	Diverge	3	3,570	4,290	B/19	C/24
Dallas Boulevard off-ramp to on-ramp	Basic	3	3,310	3,730	B/16	C/19
Dallas Boulevard on-ramp to SR 520 off-ramp	Merge	3	3,470	3,830	C/21	C/22
Dallas Boulevard on-ramp to SR 520 off-ramp	Basic	3	3,470	3,830	B/17	C/19
Dallas Boulevard on-ramp to SR 520 off-ramp	Diverge	3	3,470	3,830	C/25	C/27
SR 520 off-ramp to on-ramp	Basic	3	2,910	3,270	B/14	B/16
Downstream of SR 520 on-ramp	Merge	3	3,100	3,370	B/19	C/20
Downstream of SR 520 on-ramp	Basic	3	3,100	3,370	B/15	B/17
SR 528 Westbound						
Upstream of SR 520 off-ramp	Basic	3	3,590	3,320	B/18	B/16
Upstream of SR 520 off-ramp	Diverge	3	3,590	3,320	C/25	C/23
SR 520 off-ramp to on-ramp	Basic	3	3,490	3,130	B/17	B/15
SR 520 on-ramp to Dallas Boulevard off-ramp	Merge	3	3,850	3,490	C/22	C/20
SR 520 on-ramp to Dallas Boulevard off-ramp	Basic	3	3,850	3,490	C/19	B/17
SR 520 on-ramp to Dallas Boulevard off-ramp	Diverge	3	3,850	3,490	C/26	C/24
Dallas Boulevard off-ramp to on-ramp	Basic	3	3,730	3,310	C/19	B/16
Dallas Boulevard on-ramp to Innovation Way off-ramp	Merge	3	4,400	3,570	C/25	B/19
Dallas Boulevard on-ramp to Innovation Way off-ramp	Basic	3	4,400	3,570	C/23	B/18
Dallas Boulevard on-ramp to Innovation Way off-ramp	Diverge	3	4,400	3,570	D/28	C/24
Downstream of Innovation Way off-ramp	Basic	3	4,250	3,460	C/22	B/17

For the 2050 design year, the mainline segments analysis is summarized in **Tables 3.9** and **3.10** for the No Build and Build alternatives, respectively. The results show that most of the freeway segments along SR 528 are expected to operate at an acceptable LOS D or better but the section between Innovation Way and Dallas Boulevard is expected to operate at LOS E in both No Build and Build conditions. Future lane requirement analysis indicated that this section will need four lanes in each direction by year 2045.



Table 3.9
2050 No Build AM and PM Design Hour Freeway Segment LOS/Density (pcpmpl)

2030 NO Balla Alvi alla Pivi Desigli Hodi	Segment		Volum		LOS/Density	
Segment	Туре	Lanes	AM	PM	AM	PM
SR 528 Eastbound						
Upstream of Innovation Way on-ramp	Basic	3	5,080	6,070	D/28	E/39
Innovation Way on-ramp to Dallas Boulevard off-ramp	Merge	3	5,250	6,290	C/27	D/33
Innovation Way on-ramp to Dallas Boulevard off-ramp	Basic	3	5,250	6,290	D/30	E/42
Innovation Way on-ramp to Dallas Boulevard off-ramp	Diverge	3	5,250	6,290	C/28	D/33
Dallas Boulevard off-ramp to SR 520 off-ramp	Basic	3	4,860	5,470	D/26	D/32
Dallas Boulevard off-ramp to SR 520 off-ramp	Diverge	3	4,860	5,470	D/32	D/35
SR 520 off-ramp to on-ramp	Basic	3	4,040	4,650	C/21	C/25
Downstream of SR 520 on-ramp	Merge	3	4,470	4,870	C/27	C/28
Downstream of SR 520 on-ramp	Basic	3	4,470	4,870	C/23	D/26
SR 528 Westbound	I					
Upstream of SR 520 off-ramp	Basic	3	5,170	4,770	D/29	C/26
Upstream of SR 520 off-ramp	Diverge	3	5,170	4,770	D/32	D/31
SR 520 off-ramp to on-ramp	Basic	3	4,950	4,340	D/27	C/22
SR 520 on-ramp to Dallas Boulevard on-ramp	Merge	3	5,470	4,860	D/31	C/28
SR 520 on-ramp to Dallas Boulevard on-ramp	Basic	3	5,470	4,860	D/32	D/26
Dallas Boulevard on-ramp to Innovation Way off-ramp	Merge	3	6,370	5,250	E/35	D/28
Dallas Boulevard on-ramp to Innovation Way off-ramp	Basic	3	6,370	5,250	E/43	D/30
Dallas Boulevard on-ramp to Innovation Way off-ramp	Diverge	3	6,370	5,250	E/38	D/32
Downstream of Innovation Way off-ramp	Basic	3	6,150	5,080	E/40	D/28



Table 3.10
2050 Build AM and PM Design Hour Freeway Segment LOS/Density (pcpmpl)

2050 Build Aivi and Pivi Design Hour Fr	Segment		Volum	, ,, ,		ensity
Segment	Type	Lanes	AM	PM	AM	PM
SR 528 Eastbound						
Upstream of Innovation Way on-ramp	Basic	3	5,080	6,070	D/28	E/39
Innovation Way on-ramp to Dallas Boulevard off-ramp	Merge	3	5,250	6,290	C/27	D/33
Innovation Way on-ramp to Dallas Boulevard off-ramp	Basic	3	5,250	6,290	D/30	E/42
Innovation Way on-ramp to Dallas Boulevard off-ramp	Diverge	3	5,250	6,290	C/28	D/33
Dallas Boulevard off-ramp to on-ramp	Basic	3	4,860	5,470	D/26	D/32
Dallas Boulevard on-ramp to SR 520 off-ramp	Merge	3	5,190	5,630	D/30	D/32
Dallas Boulevard on-ramp to SR 520 off-ramp	Basic	3	5,190	5,630	D/29	D/33
Dallas Boulevard on-ramp to SR 520 off-ramp	Diverge	3	5,190	5,630	D/33	E/35
SR 520 off-ramp to on-ramp	Basic	3	4,370	4,810	C/23	C/26
Downstream of SR 520 on-ramp	Merge	3	4,710	4,990	C/28	D/28
Downstream of SR 520 on-ramp	Basic	3	4,710	4,990	C/25	D/27
SR 528 Westbound		•				
Upstream of SR 520 off-ramp	Basic	3	5,290	5,010	D/30	D/27
Upstream of SR 520 off-ramp	Diverge	3	5,290	5,010	D/33	D/32
SR 520 off-ramp to on-ramp	Basic	3	5,110	4,670	D/28	C/25
SR 520 on-ramp to Dallas Boulevard off-ramp	Merge	3	5,630	5,190	D/31	D/29
SR 520 on-ramp to Dallas Boulevard off-ramp	Basic	3	5,630	5,190	D/33	D/29
SR 520 on-ramp to Dallas Boulevard off-ramp	Diverge	3	5,630	5,190	D/34	D/33
Dallas Boulevard off-ramp to on-ramp	Basic	3	5,470	4,860	D/32	D/26
Dallas Boulevard on-ramp to Innovation Way off-ramp	Merge	3	6,370	5,250	E/35	D/28
Dallas Boulevard on-ramp to Innovation Way off-ramp	Basic	3	6,370	5,250	E/43	D/30
Dallas Boulevard on-ramp to Innovation Way off-ramp	Diverge	3	6,370	5,250	E/38	D/32
Downstream of Innovation Way off-ramp	Basic	3	6,150	5,080	E/40	D/28

3.6 Ramp Roadways Analysis

Tables 3.11 and **3.12** summarize ramp roadway capacity evaluation for the No Build and Build conditions, respectively. The results show that the ramps within the AOI are expected to have a V/C ratio of 0.4 or less in 2030 and 0.5 or less in 2050 for both No Build and Build conditions, indicating that the ramps are expected to have a considerable amount of unused capacity in the future.



Table 3.11
No Build AM and PM Design Hour Ramp Capacity Analysis

Interchange	Ramp	Lanes	Volume (vph)		Capacity	V/C						
			AM	PM	(vph)	AM	PM					
2030 No Build												
Innovation Way	Westbound off-ramp	1	150	110	1,850	0.1	0.1					
	Eastbound on-ramp	1	110	150	1,850	0.1	0.1					
Dallas Boulevard	Westbound on-ramp	1	670	260	1,850	0.4	0.1					
	Eastbound off-ramp	1	260	560	1,850	0.1	0.3					
SR 520	Westbound on-ramp	1	360	360	1,850	0.2	0.2					
	Eastbound off-ramp	1	560	560	1,850	0.3	0.3					
	Westbound off-ramp	1	130	240	1,850	0.1	0.1					
	Eastbound on-ramp	1	240	130	1,850	0.1	0.1					
2050 No Build												
Innovation Way	Westbound off-ramp	1	220	170	1,850	0.1	0.1					
	Eastbound on-ramp	1	170	220	1,850	0.1	0.1					
Dallas Boulevard	Westbound on-ramp	1	900	390	1,850	0.5	0.2					
	Eastbound off-ramp	1	390	820	1,850	0.2	0.4					
SR 520	Westbound on-ramp	1	520	520	1,850	0.3	0.3					
	Eastbound off-ramp	1	820	820	1,850	0.4	0.4					
	Westbound off-ramp	1	220	430	1,850	0.1	0.2					
	Eastbound on-ramp	1	430	220	1,850	0.2	0.1					



Table 3.12
Build AM and PM Design Hour Ramp Capacity Analysis

Interchange	Ramp	Lanes	Volume (vph)		Capacity V/C		/C				
			AM	PM	(vph)	AM	PM				
2030 Build											
Innovation Way	Westbound off-ramp	1	150	110	1,850	0.1	0.1				
	Eastbound on-ramp	1	110	150	1,850	0.1	0.1				
Dallas Boulevard	Westbound on-ramp	1	670	260	1,850	0.4	0.1				
	Eastbound off-ramp	1	260	560	1,850	0.1	0.3				
	Westbound off-ramp	1	120	180	1,850	0.1	0.1				
	Eastbound on-ramp	1	160	100	1,850	0.1	0.1				
SR 520	Westbound on-ramp	1	360	360	1,850	0.2	0.2				
	Eastbound off-ramp	1	560	560	1,850	0.3	0.3				
	Westbound off-ramp	1	100	190	1,850	0.1	0.1				
	Eastbound on-ramp	1	190	100	1,850	0.1	0.1				
2050 Build											
Innovation Way	Westbound off-ramp	1	220	170	1,850	0.1	0.1				
	Eastbound on-ramp	1	170	220	1,850	0.1	0.1				
Dallas Boulevard	Westbound on-ramp	1	900	390	1,850	0.5	0.2				
	Eastbound off-ramp	1	390	820	1,850	0.2	0.4				
	Westbound off-ramp	1	160	330	1,850	0.1	0.2				
	Eastbound on-ramp	1	330	160	1,850	0.2	0.1				
SR 520	Westbound on-ramp	1	520	520	1,850	0.3	0.3				
	Eastbound off-ramp	1	820	820	1,850	0.4	0.4				
	Westbound off-ramp	1	180	340	1,850	0.1	0.2				
	Eastbound on-ramp	1	340	180	1,850	0.2	0.1				

3.7 Intersections Analysis

3.7.1 Interchange Analysis Alternatives

The proposed modification is to add ramps to/from east at the SR 528 and Dallas Boulevard interchange which currently serves trips to/from the west only. Two configurations for the interchange (roundabout and signalized) were proposed during the feasibility study for the project and carried forward for evaluation in the current PD&E study. **Figures 3.5** and **3.6** show the preliminary conceptual layouts of the two alternatives developed during the feasibility study.

It was determined during the PD&E study that, even with the proposed full interchange, Dallas Boulevard would remain a two-lane roadway until demand triggers a need for widening. The year of need for widening Dallas Boulevard will depend on the pace at which development occurs in the region.



Information obtained during the PD&E study indicated that most of the planned development in the area will occur beyond year 2050. Therefore, the analysis for the PD&E study was conducted to determine lane geometry requirements for the full interchange with a two-lane typical section for Dallas Boulevard. This scenario was deemed the interim configuration for both alternatives for the interchange.

Figure 3.5
Preliminary Layout of Proposed Roundabout Interchange Alternative





Dallas Boulevard

528

Figure 3.6
Preliminary Layout of Proposed Signalized Interchange Alternative

3.7.2 No Build Intersections Conditions

Future No Build intersections operational analysis was conducted using the 2030 and 2050 design hour volumes on **Figures 3.1** and **3.2**, to verify operations in the opening and design years. The No Build analysis at the ramp terminal and Starry Street intersections assumed the existing conditions lane geometry presented on **Figure 2.2**. The intersection LOS and delay was evaluated using the Synchro software, Version 11. Queue lengths were estimated using SimTraffic. The analysis results for the 2030 and 2050 peak hour No Build conditions are presented in **Tables 3.13** and **3.14**. Detailed Synchro/SimTraffic output reports are provided in **Appendix B**.

The results in **Table 3.13** show that all movements are expected to operate at an acceptable LOS C or better at the Dallas Boulevard and SR 528 ramp terminal intersections in 2030 No Build conditions. The southbound movements at the Dallas Boulevard and Starry Street intersection would operate at LOS E in the AM peak hour. All other movements are expected to operate at LOS C or better in 2030 at the Starry Street intersection.



Table 3.13
2030 AM (PM) No Build Design Hour Intersection LOS/Delay (sec)

			LOS Delay		Maximum Queue	Available
Intersection	Approach	Movement		(Seconds)	Length (Feet)*	Storage
			AM (PM)	AM (PM)	AM (PM)	Length (Feet)
	Eastbound	Left	B (C)	13.0 (17.2)	85 (217)	-
	Lastboullu	Through	-	-	-	-
		Right	B (C)	13.0 (17.2)	47 (44)	720
	NA/ a attle a consul	Left	-	-	-	-
Dallas Boulevard and	Westbound	Through	-	-	-	-
SR 528		Right	-	-	-	-
Eastbound		Left	-	-	-	-
Ramp	Northbound	Through	A (A)	0.0 (0.0)	-	-
(Unsignalized)		Right	-	-	-	-
		Left	-	-	-	-
	Southbound	Through	A (A)	0.0 (0.0)	-	-
		Right	-	-	-	-
	Overall Int	tersection	B (C)	13.0 (17.2)	-	-
		Left	-	-	-	-
	Eastbound	Through	-	-	-	-
		Right	-	-	-	-
	Westbound	Left	-	-	-	-
Dallas		Through	-	-	-	-
Boulevard and		Right	-	-	-	-
SR 528 Westbound		Left	A (A)	1.4 (0.6)	176 (100)	-
Ramp	Northbound	Through	A (A)	4.5 (1.4)	176 (100)	-
(Unsignalized)		Right	-	-	-	-
		Left	-	-	_	-
	Southbound	Through	A (A)	0.0 (0.0)	20 (3)	-
		Right	A (A)	0.0 (0.0)	20 (3)	-
	Overall Int	_	A (A)	4.5 (1.4)	-	-
		Left	B (A)	10.1 (9.3)	54 (52)	-
	Eastbound	Through	B (A)	10.1 (9.3)	54 (52)	-
		Right	B (A)	10.1 (9.3)	54 (52)	_
		Left	B (B)	14.1 (10.5)	103 (72)	_
	Westbound	Through	B (B)	14.1 (10.5)	103 (72)	_
Dallas		Right	B (B)	14.1 (10.5)	103 (72)	-
Boulevard and		Left	B (C)	11.4 (18.2)	96 (102)	_
Starry Street (Unsignalized)	Northbound	Through	B (C)	11.4 (18.2)	96 (102)	_
(Right	B (C)	11.4 (18.2)	96 (102)	_
		Left	E (B)	35.7 (10.6)	252 (92)	_
	Southbound	Through	E (B)	35.7 (10.6)	252 (92)	-
		_				-
	Over-III :	Right	E (B)	35.7 (10.6)	252 (92)	-
	Overall Int	ersection	E (C)	35.7 (18.2)	-	-

^{*}SimTraffic maximum queue length



Table 3.14
2050 AM (PM) No Build Design Hour Intersection LOS/Delay (sec)

	2030 7 1111	(i ivi) ito buil	Delay		Maximum Queue	Available
Intersection	Approach	Movement	LOS	(Seconds)	Length (Feet)*	Storage
			AM (PM)	AM (PM)	AM (PM)	Length (Feet)
		Left	D (F)	29.5 (558.5)	227 (1,622)	-
	Eastbound	Through	-	-	-	-
		Right	D (F)	29.5 (558.5)	107 (820)	720
		Left	-	-	-	-
Dallas Boulevard and	Westbound	Through	-	1	-	-
SR 528		Right	-	1	-	-
Eastbound		Left	-	1	-	-
Ramp	Northbound	Through	A (A)	0.0 (0.0)	105 (0)	-
(Unsignalized)		Right	-	-	-	-
		Left	-	-	-	-
	Southbound	Through	A (A)	0.0 (0.0)	-	-
		Right	-	-	-	-
	Overall Int	tersection	D (F)	29.5 (558.5)	-	-
		Left	-	-	-	-
	Eastbound	Through	-	-	-	-
		Right	-	-	-	-
	Westbound	Left	-	-	-	-
Dallas		Through	-	-	-	-
Boulevard and SR 528		Right	-	-	-	-
Westbound		Left	A (A)	3.7 (2.7)	532 (392)	-
Ramp	Northbound	Through	A (A)	6.3 (3.3)	532 (392)	-
(Unsignalized)		Right	-	-	-	-
		Left	-	-	-	-
	Southbound	Through	A (A)	0.0 (0.0)	77 (3)	-
		Right	A (A)	0.0 (0.0)	-	-
	Overall Int	ersection	A (A)	6.3 (3.3)	-	-
		Left	B (B)	13.5 (11.3)	77 (62)	-
	Eastbound	Through	B (B)	13.5 (11.3)	77 (62)	-
		Right	B (B)	13.5 (11.3)	77 (62)	-
		Left	E (B)	46.5 (14.7)	273 (103)	-
5 II	Westbound	Through	E (B)	46.5 (14.7)	273 (103)	-
Dallas Boulevard and		Right	E (B)	46.5 (14.7)	273 (103)	-
Starry Street		Left	D (F)	31.7 (338.7)	215 (260)	-
(Unsignalized)	Northbound	Through	D (F)	31.7 (338.7)	215 (260)	-
		Right	D (F)	31.7 (338.7)	215 (260)	-
		Left	F (C)	319.8 (16.0)	1,304 (121)	-
	Southbound	Through	F (C)	319.8 (16.0)	1,304 (121)	-
		Right	F (C)	319.8 (16.0)	1,304 (121)	-
	Overall In	tersection	F (F)	319.8 (338.7)	-	-

^{*}SimTraffic maximum queue length



In the 2050 design year No Build conditions (**Table 3.14**), most of the movements are expected to operate at LOS D or better at the Dallas Boulevard and SR 528 ramp terminal intersections, except for the eastbound left and right turns at the SR 528 eastbound off-ramp which are anticipated to operate at an unacceptable LOS F in the PM peak hour. The results show very long delays and queues extending along the full length of the ramp and onto the freeway mainline. This is mainly due to lack of capacity at the off-ramp, along Dallas Boulevard and at the adjacent intersection at Starry Street which is within close proximity. The westbound movements at the Dallas Boulevard and Starry Street intersection would operate at LOS E and the southbound movements would operate at an unacceptable LOS F in the AM peak hour. In the PM, most of the movements are expected to operate at LOS C or better, except for the northbound movements which are anticipated to operate at LOS F. Northbound queues at the Starry Street intersection would extend upstream to the interchange ramp terminals, compounding the backups along the eastbound off-ramp and mainline.

3.7.3 Build Intersections Conditions - Interim

Future intersections operational analysis for the Build interchange conditions was primarily conducted to determine interim lane geometry requirements for the roundabout and signalized alternatives, assuming a two-lane typical section for Dallas Boulevard (interim), as discussed in Section 3.7.1. In addition, the interim configurations also assumed that the All-Way-Stop Control at the Starry Street intersection with Dallas Boulevard would be maintained until a need for signalizing and/or adding turn lanes is established, after the interchange is open to traffic. The roundabout alternative was evaluated using the SIDRA software, Version 9, whereas, the signalized intersection alternative was evaluated using the Synchro software, Version 11. The analysis was based on the 2030 and 2050 design hour volumes presented in Figures 3.3 and 3.4 and the results are presented in Tables 3.15 through 3.18. The proposed lane geometry for the interim conditions is graphically depicted on Figures 3.7 and 3.8, that also shows the proposed storage lengths for the turn bays. For the signalized intersection, queue lengths were estimated using SimTraffic. Detailed SIDRA and Synchro/SimTraffic reports are provided in Appendix B.

The interim Build results in **Tables 3.15** and **3.16** show that all movements at the proposed Dallas Boulevard and SR 528 full interchange ramp terminals are expected to operate at LOS A in 2030 for the roundabout alternative, and an acceptable LOS C or better for the signalized intersection alternative. The overall LOS is A for the roundabout alternative and B for the signalized intersection. The results also show that most of the movements at the unsignalized intersection of Dallas Boulevard and Starry Street are expected to operate at an acceptable LOS D or better in 2030 peak hours, even with single lane approaches shared by all movements (left/through/right). The only exception is the southbound approach which is reported with a LOS F in 2030 AM and is not expected to impact the interchange. When the interchange is open to traffic, operations will need to be monitored at the Starry Street intersection and data collected after traffic stabilizes to evaluate when signalization and/or addition of turn lanes will be required.



Table 3.15
2030 AM (PM) Build Design Hour Intersection LOS/Delay (sec)
Roundabout Interchange Alternative – Interim

Intonocation			LOS	Delay (Seconds)	Maximum Queue Length (Feet)*
Intersection	Approach	Movement	AM (PM)	AM (PM)	AM (PM)
		Left	A (A)	5.2 (7.5)	14 (52)
	Eastbound	Through	-	-	-
		Right	A (A)	5.1 (4.6)	15 (16)
		Left	-	-	-
Dallas	Westbound	Through	-	-	-
Boulevard and		Right	-	-	-
SR 528 Eastbound		Left	-	-	-
Ramps	Northbound	Through	A (A)	6.6 (8.2)	48 (42)
(Roundabout)		Right	A (A)	6.6 (8.2)	48 (42)
		Left	A (A)	5.6 (4.4)	0 (0)
	Southbound	Through	A (A)	5.6 (4.4)	0 (0)
		Right	-	-	-
	Overall Int	ersection	A (A)	5.8 (6.5)	-
		Left	-	-	-
	Eastbound	Through	-	-	-
		Right	-	-	-
	Westbound	Left	A (A)	4.4 (6.3)	7 (15)
Dallas		Through	-	-	-
Boulevard and SR 528		Right	A (A)	3.6 (5.3)	5 (9)
Westbound	Northbound	Left	A (A)	5.3 (7.4)	0 (0)
Ramps		Through	A (A)	5.3 (7.4)	0 (0)
(Roundabout)		Right	-	-	-
		Left	-	-	-
	Southbound	Through	A (A)	6.6 (4.3)	42 (15)
		Right	A (A)	0.0 (0.0)	0 (0)
	Overall Int	ersection	A (A)	3.5 (5.5)	-
		Left	B (A)	10.8 (9.7)	56 (47)
	Eastbound	Through	B (A)	10.8 (9.7)	56 (47)
		Right	B (A)	10.8 (9.7)	56 (47)
		Left	C (B)	16.2 (11.1)	137 (71)
D-II-	Westbound	Through	C (B)	16.2 (11.1)	137 (71)
Dallas Boulevard and		Right	C (B)	16.2 (11.1)	137 (71)
Starry Street		Left	B (D)	13.6 (26.3)	91 (226)
(Unsignalized)	Northbound	Through	B (D)	13.6 (26.3)	91 (226)
		Right	B (D)	13.6 (26.3)	91 (226)
		Left	F (B)	59.1 (11.6)	334 (108)
	Southbound	Through	F (B)	59.1 (11.6)	334 (108)
		Right	F (B)	59.1 (11.6)	334 (108)
	Overall Int	ersection	F (D)	59.1 (26.3)	-

 $[\]hbox{*SimTraffic maximum queue length reported for the Starry Street intersection}$



Table 3.16
2030 AM (PM) Build Design Hour Intersection LOS/Delay (sec)
Signalized Interchange Alternative – Interim

Intersection	Approach	Movement	LOS AM (PM)	Delay (Seconds) AM (PM)	Maximum Queue Length (Feet)* AM (PM)
		Left	C (C)	26.6 (21.8)	127 (248)
	Eastbound	Through	-	-	-
		Right	A (A)	8.0 (4.0)	61 (58)
		Left	C (B)	23.9 (14.6)	92 (111)
	Westbound	Through	-	-	-
Dallas Boulevard and		Right	A (A)	0.8 (1.6)	6 (83)
SR 528 Ramps		Left	A (B)	7.0 (12.5)	117 (80)
(Signalized)	Northbound	Through	A (B)	8.5 (19.4)	125 (149)
		Right	A (B)	8.5 (19.4)	125 (149)
	Southbound	Left	A (B)	6.5 (12.2)	60 (63)
		Through	C (C)	22.7 (23.6)	172 (108)
		Right	A (A)	6.0 (6.7)	0 (0)
	Overall Intersection		B (B)	11.8 (15.0)	-
		Left	B (A)	10.8 (9.7)	56 (47)
	Eastbound	Through	B (A)	10.8 (9.7)	56 (47)
		Right	B (A)	10.8 (9.7)	56 (47)
		Left	C (B)	16.2 (11.1)	137 (71)
Dallas	Westbound	Through	C (B)	16.2 (11.1)	137 (71)
Dallas Boulevard and		Right	C (B)	16.2 (11.1)	137 (71)
Starry Street		Left	B (D)	13.6 (26.3)	91 (226)
(Unsignalized)	Northbound	Through	B (D)	13.6 (26.3)	91 (226)
		Right	B (D)	13.6 (26.3)	91 (226)
		Left	F (B)	59.1 (11.6)	334 (108)
	Southbound	Through	F (B)	59.1 (11.6)	334 (108)
		Right	F (B)	59.1 (11.6)	334 (108)
	Overall Int	ersection	F (D)	59.1 (26.3)	-

^{*}SimTraffic maximum queue length



Table 3.17
2050 AM (PM) Build Design Hour Intersection LOS/Delay (sec)
Roundabout Interchange Alternative – Interim

				Delay	Maximum Queue	Proposed # of
Intersection	Approach	Movement	LOS	(Seconds)	Length (Feet)*	Turn Lanes/
			AM (PM)	AM (PM)	AM (PM)	Storage Length (Feet)
		Left	A (C)	8.5 (15.9)	24 (181)	-
	Eastbound	Through	-	-	-	-
		Right	A (A)	9.1 (7.6)	39 (38)	1/700′
		Left	-	-	-	-
Dallas Boulevard and	Westbound	Through	-	-	-	-
SR 528		Right	-	-	-	-
Eastbound		Left	-	-	-	-
Ramps	Northbound	Through	C (F)	17.4 (113.2)	356 (1,476)	-
(Roundabout)		Right	C (F)	17.4 (113.2)	356 (1,476)	-
		Left	A (A)	9.7 (6.4)	0 (0)	-
	Southbound	Through	A (A)	9.7 (6.4)	0 (0)	-
		Right	-	-	-	-
	Overall Int	ersection	B (E)	12.4 (48.5)	-	-
		Left	-	-	-	-
	Eastbound	Through	-	-	-	-
		Right	-	-	-	-
	Westbound	Left	A (C)	6.6 (22.2)	15 (75)	-
Dallas		Through	-	-	-	-
Boulevard and SR 528		Right	A (B)	4.3 (10.6)	5 (20)	1/400′
Westbound	Northbound	Left	A (D)	8.0 (31.6)	0 (0)	-
Ramps		Through	A (D)	8.0 (31.6)	0 (0)	-
(Roundabout)		Right	-	-	-	-
		Left	-	-	-	-
	Southbound	Through	C (A)	17.0 (6.8)	283 (35)	-
		Right	A (A)	0.0 (0.0)	0 (0)	1/300′
	Overall Int	ersection	A (C)	8.3 (22.4)	-	-
		Left	C (C)	31.2 (28.4)	124 (122)	-
	Eastbound	Through	C (C)	31.2 (28.4)	124 (122)	-
		Right	C (C)	31.2 (28.4)	124 (122)	-
		Left	F (D)	181.9 (51.2)	1,035 (250)	-
5.11	Westbound	Through	F (D)	181.9 (51.2)	1,035 (250)	-
Dallas Boulevard and		Right	F (D)	181.9 (51.2)	1,035 (250)	-
Starry Street		Left	B (F)	14.8 (165.6)	795 (1,023)	-
(Signalized)	Northbound	Through	B (F)	14.8 (165.6)	795 (1,023)	-
		Right	B (F)	14.8 (165.6)	795 (1,023)	-
		Left	D (B)	46.2 (14.3)	1,304 (734)	-
	Southbound	Through	D (B)	46.2 (14.3)	1,304 (734)	-
		Right	D (B)	46.2 (14.3)	1,304 (734)	
	Overall Int	ersection	E (F)	71.7 (117.1)	-	

Right-turn bypass lanes are proposed to ensure the turn lanes are not blocked by left or through movement queue.



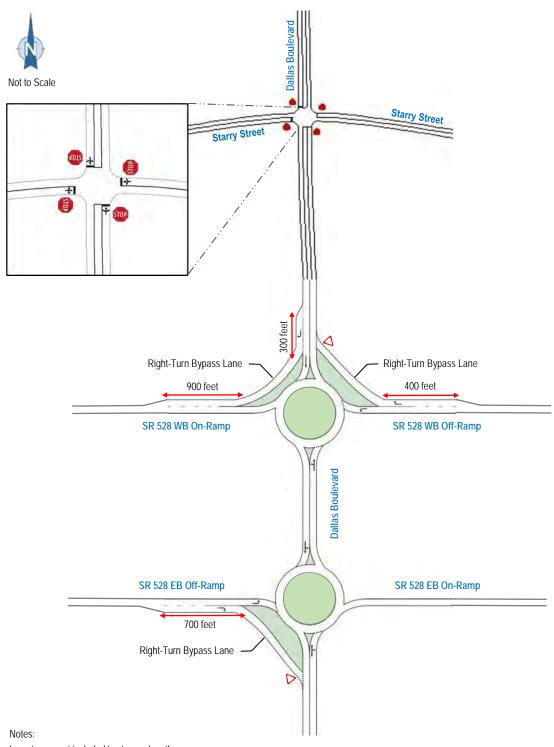
Table 3.18
2050 AM (PM) Build Design Hour Intersection LOS/Delay (sec)
Signalized Interchange Alternative – Interim

Intersection	Approach	Movement	LOS	Delay (Seconds)	Maximum Queue Length (Feet)*	Proposed # of Turn Lanes/
			AM (PM)	AM (PM)	AM (PM)	Storage Length (Feet)
		Left	D (D)	37.8 (52.0)	210 (1,872)	-
	Eastbound	Through	1	-	-	-
		Right	A (A)	9.1 (4.5)	136 (800)	1/700′
		Left	C (C)	34.4 (24.4)	142 (211)	-
Dallas	Westbound	Through	-	-	-	-
Dallas Boulevard and		Right	A (A)	0.9 (4.2)	22 (120)	1/375′
SR 528 Ramps		Left	B (B)	12.6 (13.0)	246 (400)	1/350′
(Signalized)	Northbound	Through	B (E)	14.4 (66.0)	438 (1,270)	-
		Right	B (E)	14.4 (66.0)	438 (1,270)	-
	Southbound	Left	A (B)	7.3 (13.8)	118 (100)	1/400′
		Through	C (C)	29.7 (25.5)	289 (243)	-
		Right	A (A)	4.9 (5.0)	0 (0)	1/400′
	Overall Int	ersection	B (D)	16.2 (35.4)	-	-
	Eastbound	Left	C (C)	31.2 (28.4)	124 (122)	-
		Through	C (C)	31.2 (28.4)	124 (122)	-
		Right	C (C)	31.2 (28.4)	124 (122)	-
		Left	F (D)	181.9 (51.2)	1,035 (250)	-
5.11	Westbound	Through	F (D)	181.9 (51.2)	1,035 (250)	-
Dallas Boulevard and		Right	F (D)	181.9 (51.2)	1,035 (250)	-
Starry Street		Left	B (F)	14.8 (165.6)	795 (1,023)	-
(Signalized)	Northbound	Through	B (F)	14.8 (165.6)	795 (1,023)	-
		Right	B (F)	14.8 (165.6)	795 (1,023)	-
		Left	D (B)	46.2 (14.3)	1,304 (734)	-
	Southbound	Through	D (B)	46.2 (14.3)	1,304 (734)	-
		Right	D (B)	46.2 (14.3)	1,304 (734)	-
	Overall Int	ersection	E (F)	71.7 (117.1)	-	-

^{*}SimTraffic maximum queue length



Figure 3.7
Proposed Lane Geometry and Storage Lengths for Roundabout Interchange Alternative – Interim



Lane tapers not included in storage lengths

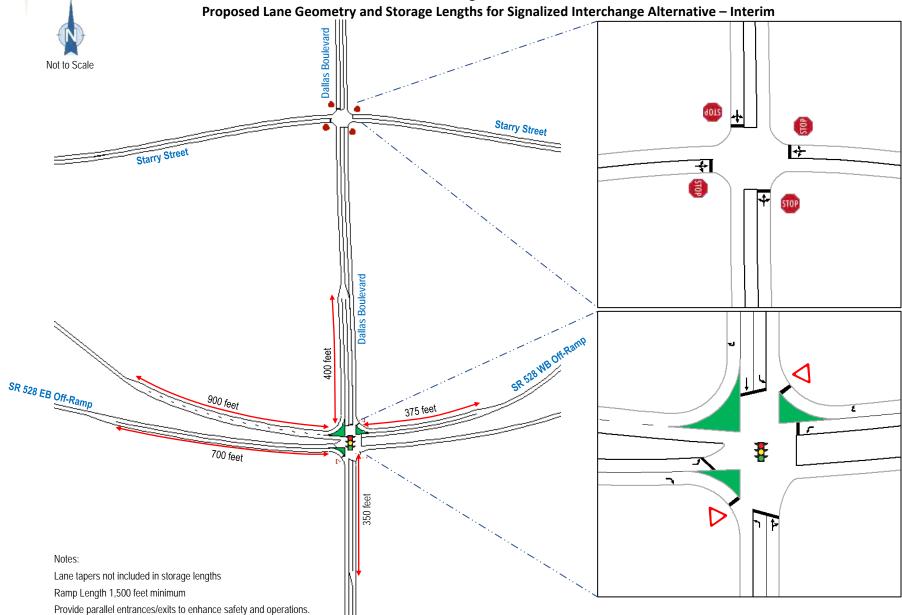
Ramp Length 1,500 feet minimum

Provide parallel entrances/exits to enhance safety and operations.

Schematic provided for illustration purposes only, design to be based on guidelines. E.g., adjust roundabout shape and bypass channelization appropriately.



Figure 3.8



Schematic provided for illustration purposes only, design to be based on guidelines.



In the 2050 design year interim Build conditions (**Tables 3.17** and **3.18**), most of the movements are expected to operate at an acceptable LOS D or better at the proposed Dallas Boulevard and SR 528 interchange ramp terminals for both the roundabout and signalized intersection alternatives, except for the northbound through and right turns at the SR 528 eastbound ramps terminal in the PM. These movements are anticipated to operate at an unacceptable LOS F for the roundabout alternative and E for the signalized intersection in the interim conditions, indicating that additional capacity improvements will be required along Dallas Boulevard. The year of need for the four-lane widening of Dallas Boulevard and an ultimate interchange configuration will depend on the pace at which development occurs in the region. Information obtained during the PD&E study indicated that most of the planned development in the area will occur beyond year 2050. The interim interchange operations will need to be monitored as development occurs to determine when the ultimate configurations will need to be implemented.

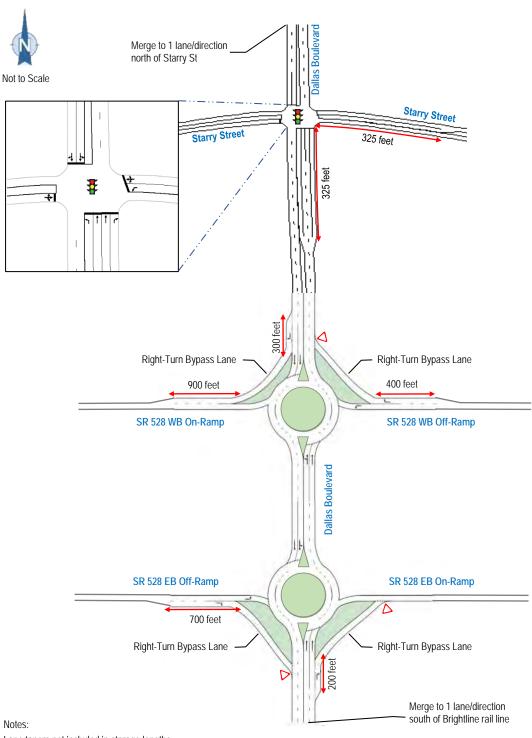
Signalization of the Dallas Boulevard and Starry Street intersection was assumed in the 2050 intersection analysis since signalization will be warranted by then. The results show that most of the movements are expected to operate at LOS D or better, except for the westbound movements in the AM and northbound movements in the PM which are anticipated to operate at LOS F. Turn lane improvements can be added to the intersection when a signal is warranted.

Build Conditions - Ultimate

Preliminary analysis was conducted to determine lane geometry for an ultimate configuration when Dallas Boulevard is widened to four lanes. Based on the initial analysis, the lane geometry presented in **Figures 3.9** and **3.10** was developed. However, further evaluation will need to be conducted to refine the ultimate intersections lane geometry as development occurs in the area and a need for widening Dallas Boulevard is determined.



Figure 3.9
Proposed Lane Geometry and Storage Lengths for Roundabout Interchange Alternative – Ultimate



Lane tapers not included in storage lengths

Ramp Length 1,500 feet minimum

Provide parallel entrances/exits to enhance safety and operations.

Schematic provided for illustration purposes only, design to be based on guidelines. E.g., adjust roundabout shape and bypass channelization appropriately.



Schematic provided for illustration purposes only, design to be based on guidelines.

Proposed Lane Geometry and Storage Lengths for Signalized Interchange Alternative – Ultimate Merge to 1 lane/direction north of Starry St Dallas Boulevard Not to Scale 4 1 Starry Street # 400 feet SR 528 WB Off-Ramp SR 528 EB Off-Ramp 375 feet # 700 feet 350 feet Notes: Lane tapers not included in storage lengths Ramp Length 1,500 feet minimum Merge to 1 lane/direction Provide parallel entrances/exits to enhance safety and operations. south of Brightline rail line

Figure 3.10

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4.0 Conclusion

The SR 528 and Dallas Boulevard interchange PD&E study is evaluating addition of ramps to/from east and improving the ramp terminal intersections. Addition of ramps to and from the east will provide more efficient access points to better serve trips originating or ending in the Wedgefield residential area, as well as other planned developments along SR 528 near the interchange of Dallas Boulevard. The analysis showed that traffic would be diverted from the SR 520 ramps to/from the east of SR 528 to the proposed Dallas Boulevard ramps and new trips would be induced due to planned future developments in the area.

Two configurations for the interchange (roundabout and signalized) were proposed during the feasibility study for the project and carried forward for evaluation in the PD&E study. It was determined during the PD&E study that, even with the proposed full interchange, Dallas Boulevard would remain a two-lane roadway until demand triggers a need for widening. Therefore, the analysis was conducted to determine interim lane geometry requirements for the full interchange with a two-lane typical section for Dallas Boulevard. Both the roundabout and signalized interchange alternatives are expected to operate acceptably in the interim conditions. The existing All-Way-Stop Control at the Dallas Boulevard and Starry Street intersection is not expected to impact the interchange by the 2030 opening year, based on traffic projections. However, when the interchange is open to traffic, operations will need to be monitored at the Starry Street intersection and data collected after traffic stabilizes to evaluate when signalization and/or addition of turn lanes will be required.

The year of need for the four-lane widening of Dallas Boulevard and an ultimate interchange configuration will depend on the pace at which development occurs in the region. Information obtained during the PD&E study indicated that most of the planned development in the area will occur beyond year 2050. The interim interchange operations will need to be monitored as development occurs to determine when the ultimate configurations will need to be implemented. Preliminary analysis was conducted to determine lane geometry for an ultimate configuration when Dallas Boulevard is widened to four lanes. Both the roundabout and signalized interchange alternatives are expected to operate acceptably in the long term with the proposed ultimate lane geometry. However, further evaluation will need to be conducted to refine the ultimate intersections lane geometry as development occurs in the area and a need for widening Dallas Boulevard is determined.



Appendices



Appendix A

Existing Conditions Analysis:

- HCS Reports
- Synchro/SimTraffic Reports

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/17/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Upstream of Innovation Way on-ramp	Units	U.S. Customary
Geometric Data			
Number of Lanes, In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	1730	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	938
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.40
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	73.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	12.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

HCSTM Freeways Version 7.9.6 2022 AM EB_1.xuf

		HCS7 Freewa	y Merge Report		
Project Information					
Analyst	CDM Smit	h	Date	1/18/2023	
Agency	CDM Smit	h	Analysis Year	2022	
Jurisdiction	Orange Co	ounty	Time Analyzed	Existing Al	M Peak
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custo	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			2	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	908	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	r
Weather Type			Non-Severe Weather	Non-Seve	re Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			1730 75		
Peak Hour Factor (PHF)			0.95		
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			1875	81	
Capacity (c), pc/h			4704	2058	
Volume-to-Capacity Ratio (v/c)			0.42	0.04	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Fre	eway (No)	0
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms) 0.268		0.268
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln -		-
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h		65.1
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	1.000	Outer Lanes Freeway Speed (So	O), mi/h	73.5
Flow in Lanes 1 and 2 (v12), pc/h		1875	Ramp Junction Speed (S), mi/h 65.1		65.1
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	1956	Average Density (D), pc/mi/ln		15.0
Level of Service (LOS)		В	Density in Ramp Influence Area (DR), pc/mi/ln 15.1		

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/17/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Innovation Way on-ramp to Dallas Boulevard off- ramp	Units	U.S. Customary
Geometric Data			
Number of Lanes, In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors	-		
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity	-		
Demand Volume veh/h	1805	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	978
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.42
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	73.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	13.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	/ Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	1/18/2023	
Agency	CDM Smit	h	Analysis Year	2022	
Jurisdiction	Orange Co	ounty	Time Analyzed	Existing Al	M Peak
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custo	mary
Geometric Data				·	
			Freeway	Ramp	
Number of Lanes (N), In			2	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	ft	1500	825	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors			·		
Driver Population			All Familiar	All Familia	r
Weather Type			Non-Severe Weather	Non-Sever	re Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			1805	1805 223	
Peak Hour Factor (PHF)			0.95		
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			1957	242	
Capacity (c), pc/h			4704	2058	
Volume-to-Capacity Ratio (v/c)			0.42	0.12	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freev	vay (No)	0
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds) 0.331		0.331
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln -		-
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	63.1
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO)	mi/h	80.6
Flow in Lanes 1 and 2 (v12), pc/h		1957	Ramp Junction Speed (S), mi/h 63.1		63.1
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		15.5
Level of Service (LOS)		В	Density in Ramp Influence Area (DR), pc/mi/ln 13.7		

	HCS7 Basic Fr	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/17/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Dallas Boulevard off-ramp to SR 520 off-ramp	Units	U.S. Customary
Geometric Data			
Number of Lanes, In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity	-		
Demand Volume veh/h	1582	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	858
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	73.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	11.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Diverge Report		
Project Information					
Analyst	yst CDM Smith		Date	1/18/2023	
Agency	CDM Smit	h	Analysis Year	2022	
Jurisdiction	Orange Co	ounty	Time Analyzed	Existing Al	M Peak
Project Description	Dallas Bou 520 off-rar	levard off-ramp to SR mp	Units	U.S. Custo	mary
Geometric Data				·	
			Freeway	Ramp	
Number of Lanes (N), In			2	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	240	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	r
Weather Type			Non-Severe Weather	Non-Seve	re Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SAI	=)		0.980	0.980	
Final Capacity Adjustment Factor (C	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			1582 256		
Peak Hour Factor (PHF)			0.95		
Total Trucks, %			3.00		
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			1715	278	
Capacity (c), pc/h			4704	2058	
Volume-to-Capacity Ratio (v/c)			0.36	0.14	
Speed and Density					
Upstream Equilibrium Distance (LEC	Ω), ft	-	Number of Outer Lanes on Fre	eway (No)	0
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds) 0.33		0.335
Downstream Equilibrium Distance ((LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln -		-
Distance to Downstream Ramp (LD	istance to Downstream Ramp (LDOWN), ft -		Off-Ramp Influence Area Spee	d (SR), mi/h	62.9
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	1.000	Outer Lanes Freeway Speed (S	O), mi/h	80.6
Flow in Lanes 1 and 2 (v12), pc/h		1715	Ramp Junction Speed (S), mi/h 62.9		62.9
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		13.6
Level of Service (LOS)		В	Density in Ramp Influence Area (DR), pc/mi/ln 16.8		

Smith Smith ge County	Date Analysis Year	1/17/2023
Smith ge County		
ge County	Analysis Year	
		2022
On off roman to the	Time Analyzed	Existing AM Peak
20 off-ramp to on-	Units	U.S. Customary
	Terrain Type	Level
	Percent Grade, %	-
sured	Grade Length, mi	-
	Total Ramp Density (TRD), ramps/mi	-
	Free-Flow Speed (FFS), mi/h	75.0
ly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
ncident	Demand Adjustment Factor (DAF)	1.000
	Heavy Vehicle Adjustment Factor (fHV)	0.971
	Flow Rate (V _p), pc/h/ln	718
	Capacity (c), pc/h/ln	2400
	Adjusted Capacity (cadj), pc/h/ln	2352
	Volume-to-Capacity Ratio (v/c)	0.31
	Average Speed (S), mi/h	73.5
	Density (D), pc/mi/ln	9.8
	Density (D), pc/mi/ln Level of Service (LOS)	9.8 A
1	Severe Weather	Severe Weather Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Heavy Vehicle Adjustment Factor (fHV) Flow Rate (Vp), pc/h/ln Capacity (c), pc/h/ln Adjusted Capacity (cadj), pc/h/ln Volume-to-Capacity Ratio (v/c) Average Speed (S), mi/h

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	HCS7 Freeway	Merge Report			
Project Information					
	DM Smith	Date	1/24/2023		
Agency C	DM Smith	Analysis Year	2022		
Jurisdiction O	range County	Time Analyzed	Existing Al	M Peak	
Project Description D	ownstream of SR 520 on-ramp	Units	U.S. Custo	mary	
Geometric Data					
		Freeway	Ramp		
Number of Lanes (N), In		2	1		
Free-Flow Speed (FFS), mi/h		75.0	45.0		
Segment Length (L) / Acceleration Ler	ngth (LA),ft	1500	390		
Terrain Type		Level	Level		
Percent Grade, %		-	-		
Segment Type / Ramp Type		Freeway	Right-Side	d One-Lane	
Adjustment Factors					
Driver Population		All Familiar	All Familia	r	
Weather Type		Non-Severe Weather	Non-Sever	Non-Severe Weather	
Incident Type		No Incident	-	-	
Final Speed Adjustment Factor (SAF)		0.980	0.980	0.980	
Final Capacity Adjustment Factor (CAI	=)	0.980	0.980		
Demand Adjustment Factor (DAF)		1.000	1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)		1326	65		
Peak Hour Factor (PHF)		0.95	0.95		
Total Trucks, %		3.00	3.00		
Single-Unit Trucks (SUT), %		-	-	-	
Tractor-Trailers (TT), %		-	-	-	
Heavy Vehicle Adjustment Factor (fHV)	0.971	0.971		
Flow Rate (vi),pc/h		1437	70		
Capacity (c), pc/h		4704	2058	2058	
Volume-to-Capacity Ratio (v/c)		0.32	0.03		
Speed and Density					
Upstream Equilibrium Distance (LEQ),	ft -	Number of Outer Lanes on Freew	ay (No)	0	
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)		0.304	
Downstream Equilibrium Distance (LE	Q), ft -	Flow Outer Lanes (vOA), pc/h/ln		-	
Distance to Downstream Ramp (LDOW	/N), ft -	On-Ramp Influence Area Speed (SR), mi/h 63.9		63.9	
Prop. Freeway Vehicles in Lane 1 and	2 (PFM) 1.000	Outer Lanes Freeway Speed (SO), mi/h 73.5		73.5	
Flow in Lanes 1 and 2 (v12), pc/h	1437	Ramp Junction Speed (S), mi/h		63.9	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 1507	Average Density (D), pc/mi/ln		11.8	
Level of Service (LOS)	В	Density in Ramp Influence Area (I	DR), pc/mi/ln	14.8	

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/24/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Downstream of SR 520 on-ramp	Units	U.S. Customary
Geometric Data			
Number of Lanes, In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	1391	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	754
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	73.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	10.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	А
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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HCS7 Basic Freeway Report						
Project Information						
Analyst	CDM Smith	Date	1/24/2023			
Agency	CDM Smith	Analysis Year	2022			
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak			
Project Description	Upstream of SR 520 off- ramp	Units	U.S. Customary			
Geometric Data						
Number of Lanes, In	2	Terrain Type	Level			
Segment Length (L), ft	-	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors						
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980			
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980			
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000			
Demand and Capacity						
Demand Volume veh/h	1706	Heavy Vehicle Adjustment Factor (fHV)	0.971			
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	924			
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352			
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	73.5			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	12.6			
Total Ramp Density Adjustment	-	Level of Service (LOS)	В			
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5					

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	ŀ	HCS7 Freeway	Diverge Report			
Project Information						
Analyst	CDM Smith	ı	Date	1/24/2023		
Agency	CDM Smith	ı	Analysis Year	2022		
Jurisdiction	Orange Co	unty	Time Analyzed	Existing AN	И Peak	
Project Description	Upstream c	of SR 520 off-ramp	Units	U.S. Custor	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration Lo	ength (LA),f	ft	1500	230		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familiar		
Weather Type		Non-Severe Weather	Non-Sever	Non-Severe Weather		
Incident Type			No Incident	-	-	
Final Speed Adjustment Factor (SAF)			0.980	0.980		
Final Capacity Adjustment Factor (CA	AF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi)			1706	86		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00		
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-	-	
Heavy Vehicle Adjustment Factor (fH	V)		0.971	0.971	0.971	
Flow Rate (vi),pc/h			1849	93	93	
Capacity (c), pc/h			4704	2058	2058	
Volume-to-Capacity Ratio (v/c)			0.39	0.05		
Speed and Density						
Upstream Equilibrium Distance (LEQ)	, ft	-	Number of Outer Lanes on F	reeway (No)	0	
Distance to Upstream Ramp (LUP), ft		-	Speed Index (DS)		0.318	
Downstream Equilibrium Distance (L	EQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln -		-	
Distance to Downstream Ramp (LDO	wn), ft	-	Off-Ramp Influence Area Speed (SR), mi/h 63		63.5	
Prop. Freeway Vehicles in Lane 1 and	2 (PFD)	1.000	Outer Lanes Freeway Speed	(SO), mi/h	80.6	
Flow in Lanes 1 and 2 (v12), pc/h		1849	Ramp Junction Speed (S), mi	/h	63.5	
Flow Entering Ramp-Infl. Area (vR12),	, pc/h	-	Average Density (D), pc/mi/li	n	14.6	
Level of Service (LOS)		В	Density in Ramp Influence A	rea (DR), pc/mi/ln	18.1	

HCS7 Basic Freeway Report						
Project Information						
CDM Smith	Date	1/17/2023				
CDM Smith	Analysis Year	2022				
Orange County	Time Analyzed	Existing AM Peak				
SR 520 off-ramp to on- ramp	Units	U.S. Customary				
2	Terrain Type	Level				
-	Percent Grade, %	-				
Measured	Grade Length, mi	-				
-	Total Ramp Density (TRD), ramps/mi	-				
-	Free-Flow Speed (FFS), mi/h	75.0				
-						
Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980				
Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980				
No Incident	Demand Adjustment Factor (DAF)	1.000				
-		•				
1620	Heavy Vehicle Adjustment Factor (fHV)	0.971				
0.95	Flow Rate (V _p), pc/h/ln	878				
3.00	Capacity (c), pc/h/ln	2400				
-	Adjusted Capacity (cadj), pc/h/ln	2352				
-	Volume-to-Capacity Ratio (v/c)	0.37				
2.00						
-		-				
-	Average Speed (S), mi/h	73.5				
-	Density (D), pc/mi/ln	11.9				
-	Level of Service (LOS)	В				
73.5						
	CDM Smith CDM Smith Orange County SR 520 off-ramp to on-ramp 2	CDM Smith Date CDM Smith Analysis Year Orange County Time Analyzed SR 520 off-ramp to on-ramp 2 Terrain Type - Percent Grade, % Measured Grade Length, mi - Total Ramp Density (TRD), ramps/mi - Free-Flow Speed (FFS), mi/h - Mostly Familiar Final Speed Adjustment Factor (SAF) Non-Severe Weather Final Capacity Adjustment Factor (CAF) No Incident Demand Adjustment Factor (fhv) 0.95 Flow Rate (Vp), pc/h/ln 3.00 Capacity (c), pc/h/ln - Adjusted Capacity (cadj), pc/h/ln - Volume-to-Capacity Ratio (v/c) 2.00 Average Speed (S), mi/h - Density (D), pc/mi/ln - Level of Service (LOS)				

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		HCS7 Freeway	y Merge Report			
Project Information						
Analyst	CDM Smitl	า	Date	1/18/2023		
Agency	CDM Smitl	า	Analysis Year	2022		
Jurisdiction	Orange Co	ounty	Time Analyzed	Existing Al	M Peak	
Project Description	SR 520 on- Boulevard	ramp to Dallas on-ramp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Acceleration	Length (LA),	ft	1500	640		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SAI	=)		0.980	0.980		
Final Capacity Adjustment Factor (C	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			1620	226		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			1756	245		
Capacity (c), pc/h			4704	2058		
Volume-to-Capacity Ratio (v/c)			0.43	0.12		
Speed and Density						
Upstream Equilibrium Distance (LEC	Q), ft	-	Number of Outer Lanes on Freev	vay (No)	0	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms)		0.293	
Downstream Equilibrium Distance ((LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		-	
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h 64.3		64.3	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO),	mi/h	73.5	
Flow in Lanes 1 and 2 (v12), pc/h		1756	Ramp Junction Speed (S), mi/h		64.3	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2001	Average Density (D), pc/mi/ln		15.6	
Level of Service (LOS)		В	Density in Ramp Influence Area (DR), pc/mi/ln	17.0	

HCS7 Basic Freeway Report						
Project Information						
CDM Smith	Date	1/17/2023				
CDM Smith	Analysis Year	2022				
Orange County	Time Analyzed	Existing AM Peak				
SR 520 on-ramp to Dallas Boulevard on-ramp	Units	U.S. Customary				
2	Terrain Type	Level				
-	Percent Grade, %	-				
Measured	Grade Length, mi	-				
-	Total Ramp Density (TRD), ramps/mi	-				
-	Free-Flow Speed (FFS), mi/h	75.0				
-						
Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980				
Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980				
No Incident	Demand Adjustment Factor (DAF)	1.000				
1846	Heavy Vehicle Adjustment Factor (fHV)	0.971				
0.95	Flow Rate (Vp), pc/h/ln	1000				
3.00	Capacity (c), pc/h/ln	2400				
-	Adjusted Capacity (cadj), pc/h/ln	2352				
-	Volume-to-Capacity Ratio (v/c)	0.43				
2.00						
-	Average Speed (S), mi/h	73.5				
-	Density (D), pc/mi/ln	13.6				
-	Level of Service (LOS)	В				
73.5						
	CDM Smith CDM Smith Orange County SR 520 on-ramp to Dallas Boulevard on-ramp 2	CDM Smith Date CDM Smith Analysis Year Orange County Time Analyzed SR 520 on-ramp to Dallas Boulevard on-ramp 2 Terrain Type - Percent Grade, % Measured Grade Length, mi - Total Ramp Density (TRD), ramps/mi Free-Flow Speed (FFS), mi/h - Final Speed Adjustment Factor (SAF) Non-Severe Weather Final Capacity Adjustment Factor (CAF) No Incident Demand Adjustment Factor (DAF) 1846 Heavy Vehicle Adjustment Factor (fHV) 0.95 Flow Rate (Vp), pc/h/ln 3.00 Capacity (c), pc/h/ln - Adjusted Capacity (cadj), pc/h/ln - Volume-to-Capacity Ratio (v/c) 2.00 - Average Speed (S), mi/h - Density (D), pc/mi/ln - Level of Service (LOS)				

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		HCS7 Freeway	y Merge Report			
Project Information						
Analyst	CDM Smit	h	Date	1/18/2023		
Agency	CDM Smit	h	Analysis Year	2022		
Jurisdiction	Orange Co	ounty	Time Analyzed	Existing AN	M Peak	
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Acceleration	Length (LA),	ft	1500	825		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population		All Familiar	All Familia	•		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SA	F)		0.980	0.980		
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			1846	545		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			2001	591		
Capacity (c), pc/h			4704	2058		
Volume-to-Capacity Ratio (v/c)			0.55	0.29		
Speed and Density						
Upstream Equilibrium Distance (LEG	হ), ft	-	Number of Outer Lanes on Freew	ay (No)	0	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms)		0.300	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln -		-	
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h 64.		64.0	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO),	mi/h	73.5	
Flow in Lanes 1 and 2 (v12), pc/h		2001	Ramp Junction Speed (S), mi/h		64.0	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2592	Average Density (D), pc/mi/ln		20.2	
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 20.3		20.3	

	HCS7 Basic Fi	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/17/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak
Project Description	Dallas Boulevard on-ramp to Innovation Way off- ramp	Units	U.S. Customary
Geometric Data			
Number of Lanes, In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity	-		
Demand Volume veh/h	2391	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1296
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	72.6
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date	1/18/2023		
Agency	CDM Smit	h	Analysis Year	2022		
Jurisdiction	Orange Co	ounty	Time Analyzed	Existing Al	M Peak	
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary	
Geometric Data				·		
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration	Length (LA)	ft	1500	270		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SA	F)		0.980	0.980		
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi)			2391	85		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			2592	92		
Capacity (c), pc/h			4704	2058		
Volume-to-Capacity Ratio (v/c)			0.55	0.04		
Speed and Density						
Upstream Equilibrium Distance (LEG	ຊ), ft	-	Number of Outer Lanes on Free	vay (No)	0	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.318	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		-	
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	63.5	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO)	, mi/h	80.6	
Flow in Lanes 1 and 2 (v12), pc/h		2592	Ramp Junction Speed (S), mi/h		63.5	
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		20.4	
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 24.1		24.1	

HCS7 Basic Freeway Report						
Project Information						
Analyst	CDM Smith	Date	1/17/2023			
Agency	CDM Smith	Analysis Year	2022			
Jurisdiction	Orange County	Time Analyzed	Existing AM Peak			
Project Description	Downstream of Innovation Way off-ramp	Units	U.S. Customary			
Geometric Data						
Number of Lanes, In	2	Terrain Type	Level			
Segment Length (L), ft	-	Percent Grade, %	-			
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-			
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-			
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors			-			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980			
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980			
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000			
Demand and Capacity						
Demand Volume veh/h	2306	Heavy Vehicle Adjustment Factor (fHV)	0.971			
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1250			
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352			
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.53			
Passenger Car Equivalent (ET)	2.00					
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	72.9			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.1			
Total Ramp Density Adjustment	-	Level of Service (LOS)	В			
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5					

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HCS7 Basic Freeway Report								
Project Information								
Analyst	CDM Smith	Date	1/17/2023					
Agency	CDM Smith	Analysis Year	2022					
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak					
Project Description	Upstream of Innovation Way on-ramp	Units	U.S. Customary					
Geometric Data								
Number of Lanes, In	2	Terrain Type	Level					
Segment Length (L), ft	-	Percent Grade, %	-					
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-					
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-					
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0					
Right-Side Lateral Clearance, ft	-							
Adjustment Factors								
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980					
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980					
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000					
Demand and Capacity								
Demand Volume veh/h	2300	Heavy Vehicle Adjustment Factor (fHV)	0.971					
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1246					
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400					
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352					
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.53					
Passenger Car Equivalent (ET)	2.00							
Speed and Density								
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	72.9					
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.1					
Total Ramp Density Adjustment	-	Level of Service (LOS)	В					
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5							

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HCS7 Freeway Merge Report								
Project Information								
Analyst	CDM Smitl	h	Date	1/18/2023				
Agency	CDM Smitl	h	Analysis Year	2022				
Jurisdiction	Orange Co	ounty	Time Analyzed	Existing PN	Existing PM Peak			
Project Description	Innovation Dallas Bou	Way on-ramp to levard off-ramp	Units	U.S. Custon	U.S. Customary			
Geometric Data								
		Freeway	Ramp					
Number of Lanes (N), In			2	1	1			
Free-Flow Speed (FFS), mi/h		75.0	45.0	45.0				
Segment Length (L) / Acceleration Length (LA),ft		1500	908	908				
Terrain Type		Level	Level	Level				
Percent Grade, %		-	-	-				
Segment Type / Ramp Type		Freeway	Right-Side	Right-Sided One-Lane				
Adjustment Factors								
Driver Population		All Familiar	All Familia	All Familiar				
Weather Type		Non-Severe Weather	Non-Sever	Non-Severe Weather				
Incident Type		No Incident	-	-				
Final Speed Adjustment Factor (SAF)		0.980	0.980	0.980				
Final Capacity Adjustment Factor (CAF)		0.980	0.980	0.980				
Demand Adjustment Factor (DAF)		1.000	1.000	1.000				
Demand and Capacity								
Demand Volume (Vi)		2300	101	101				
Peak Hour Factor (PHF)		0.95	0.95					
Total Trucks, %		3.00	3.00	3.00				
Single-Unit Trucks (SUT), %		-	-	-				
Tractor-Trailers (TT), %		-	-					
Heavy Vehicle Adjustment Factor (fHV)		0.971	0.971					
Flow Rate (vi),pc/h		2493	109	109				
Capacity (c), pc/h		4704	2058	2058				
Volume-to-Capacity Ratio (v/c)		0.55	0.05	0.05				
Speed and Density								
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	0			
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms)		0.294			
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		-			
Distance to Downstream Ramp (LDOWN), ft -		On-Ramp Influence Area Speed (SR), mi/h		64.2				
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h		73.5			
Flow in Lanes 1 and 2 (v12), pc/h		2493	Ramp Junction Speed (S), mi/h		64.2			
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2602	Average Density (D), pc/mi/ln		20.3			
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln		20.1			

HCS7 Basic Freeway Report					
Project Information					
Analyst	CDM Smith	Date	1/17/2023		
Agency	CDM Smith	Analysis Year	2022		
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak		
Project Description	Innovation Way on-ramp to Dallas Boulevard off- ramp	Units	U.S. Customary		
Geometric Data					
Number of Lanes, In	2	Terrain Type	Level		
Segment Length (L), ft	-	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity	-				
Demand Volume veh/h	2401	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1302		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	72.5		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.0		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freeway	/ Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date	1/18/2023		
Agency	CDM Smit	h	Analysis Year	2022		
Jurisdiction	Orange Co	ounty	Time Analyzed	Existing PN	M Peak	
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custo	mary	
Geometric Data			·	·		
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration	Length (LA)	ft	1500	825		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			·			
Driver Population		All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type		No Incident	-			
Final Speed Adjustment Factor (SA	F)		0.980	0.980		
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi)			2401	351		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			2603	381		
Capacity (c), pc/h			4704	2058	2058	
Volume-to-Capacity Ratio (v/c)		0.55	0.19			
Speed and Density						
Upstream Equilibrium Distance (LEG	ე), ft	-	Number of Outer Lanes on Freev	vay (No)	0	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.344	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln -		-	
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h		62.7	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO)	mi/h	80.6	
Flow in Lanes 1 and 2 (v12), pc/h		2603	Ramp Junction Speed (S), mi/h		62.7	
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		20.8	
Level of Service (LOS)		В	Density in Ramp Influence Area (DR), pc/mi/ln 19.2		19.2	

HCS7 Basic Freeway Report					
Project Information					
Analyst	CDM Smith	Date	1/17/2023		
Agency	CDM Smith	Analysis Year	2022		
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak		
Project Description	Dallas Boulevard off-ramp to SR 520 off-ramp	Units	U.S. Customary		
Geometric Data					
Number of Lanes, In	2	Terrain Type	Level		
Segment Length (L), ft	-	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	2050	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1111		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	73.4		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.1		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freeway	Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date	1/18/2023		
Agency	CDM Smit	h	Analysis Year	2022		
Jurisdiction	Orange Co	ounty	Time Analyzed	Existing PN	M Peak	
Project Description	Dallas Bou 520 off-rai	levard off-ramp to SR mp	Units	U.S. Custo	mary	
Geometric Data			·			
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration	Length (LA)	ft	1500	240		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population		All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	0.980	
Final Capacity Adjustment Factor (Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi)			2050	402		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			2222	436		
Capacity (c), pc/h			4704	2058	2058	
Volume-to-Capacity Ratio (v/c)			0.47	0.21		
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	0	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (DS)		0.349	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln -		-	
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h		62.5	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO),	mi/h	80.6	
Flow in Lanes 1 and 2 (v12), pc/h		2222	Ramp Junction Speed (S), mi/h		62.5	
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		17.8	
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 21.2		21.2	

HCS7 Basic Freeway Report				
CDM Smith	Date	1/17/2023		
CDM Smith	Analysis Year	2022		
Orange County	Time Analyzed	Existing PM Peak		
SR 520 off-ramp to on- ramp	Units	U.S. Customary		
2	Terrain Type	Level		
-	Percent Grade, %	-		
Measured	Grade Length, mi	-		
-	Total Ramp Density (TRD), ramps/mi	-		
-	Free-Flow Speed (FFS), mi/h	75.0		
-				
Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
No Incident	Demand Adjustment Factor (DAF)	1.000		
1648	Heavy Vehicle Adjustment Factor (fHV)	0.971		
0.95	Flow Rate (V _p), pc/h/ln	894		
3.00	Capacity (c), pc/h/ln	2400		
-	Adjusted Capacity (cadj), pc/h/ln	2352		
-	Volume-to-Capacity Ratio (v/c)	0.38		
2.00				
-	Average Speed (S), mi/h	73.5		
-	Density (D), pc/mi/ln	12.2		
-	Level of Service (LOS)	В		
73.5				
	CDM Smith CDM Smith Orange County SR 520 off-ramp to on-ramp 2	CDM Smith Date CDM Smith Analysis Year Orange County Time Analyzed SR 520 off-ramp to on-ramp 2 Terrain Type - Percent Grade, % Measured Grade Length, mi - Total Ramp Density (TRD), ramps/mi - Free-Flow Speed (FFS), mi/h - Free-Flow Speed Adjustment Factor (SAF) Non-Severe Weather Final Capacity Adjustment Factor (CAF) No Incident Demand Adjustment Factor (DAF) 1648 Heavy Vehicle Adjustment Factor (fHv) 0.95 Flow Rate (Vp), pc/h/ln 3.00 Capacity (c), pc/h/ln - Adjusted Capacity (cadj), pc/h/ln - Volume-to-Capacity Ratio (v/c) 2.00 - Average Speed (S), mi/h - Density (D), pc/mi/ln - Level of Service (LOS)		

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HCS7 Freeway Merge Report					
Project Information					
Analyst C	DM Smith	Date	1/24/2023		
Agency C	DM Smith	Analysis Year	2022		
Jurisdiction C	Prange County	Time Analyzed	Existing PN	И Peak	
Project Description D	ownstream of SR 520 on-ramp	Units	U.S. Custo	mary	
Geometric Data					
		Freeway	Ramp		
Number of Lanes (N), In		2	1		
Free-Flow Speed (FFS), mi/h		75.0	45.0		
Segment Length (L) / Acceleration Le	ngth (LA),ft	1500	390		
Terrain Type		Level	Level		
Percent Grade, %		-	-		
Segment Type / Ramp Type		Freeway	Right-Side	d One-Lane	
Adjustment Factors					
Driver Population		All Familiar	All Familia	r	
Weather Type		Non-Severe Weather	Non-Sever	Non-Severe Weather	
Incident Type		No Incident	-	-	
Final Speed Adjustment Factor (SAF)		0.980	0.980	0.980	
Final Capacity Adjustment Factor (CA	F)	0.980	0.980		
Demand Adjustment Factor (DAF)		1.000	1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)		1648	45		
Peak Hour Factor (PHF)		0.95	0.95	0.95	
Total Trucks, %		3.00	3.00	3.00	
Single-Unit Trucks (SUT), %		-	-	-	
Tractor-Trailers (TT), %		-	-	-	
Heavy Vehicle Adjustment Factor (fhv)	0.971	0.971		
Flow Rate (vi),pc/h		1787	49	49	
Capacity (c), pc/h		4704	2058	2058	
Volume-to-Capacity Ratio (v/c)		0.39	0.02		
Speed and Density					
Upstream Equilibrium Distance (LEQ),	ft -	Number of Outer Lanes on Free	eway (No)	0	
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)		0.311	
Downstream Equilibrium Distance (LE	Q), ft -	Flow Outer Lanes (vOA), pc/h/ln -		-	
Distance to Downstream Ramp (LDOW	vN), ft -	On-Ramp Influence Area Speed (SR), mi/h		63.7	
Prop. Freeway Vehicles in Lane 1 and	2 (PFM) 1.000	Outer Lanes Freeway Speed (SO), mi/h 73.5		73.5	
Flow in Lanes 1 and 2 (v12), pc/h	1787	Ramp Junction Speed (S), mi/h		63.7	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 1836	Average Density (D), pc/mi/ln		14.4	
Level of Service (LOS)	В	Density in Ramp Influence Area	(DR), pc/mi/ln	17.4	

HCS7 Basic Freeway Report					
Project Information					
Analyst	CDM Smith	Date	1/24/2023		
Agency	CDM Smith	Analysis Year	2022		
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak		
Project Description	Downstream of SR 520 on-ramp	Units	U.S. Customary		
Geometric Data					
Number of Lanes, In	2	Terrain Type	Level		
Segment Length (L), ft	-	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	1693	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	918		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	73.5		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	12.5		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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HCS7 Basic Freeway Report				
CDM Smith	Date	1/24/2023		
CDM Smith	Analysis Year	2022		
Orange County	Time Analyzed	Existing PM Peak		
Upstream of SR 520 off- ramp	Units	U.S. Customary		
2	Terrain Type	Level		
-	Percent Grade, %	-		
Measured	Grade Length, mi	-		
-	Total Ramp Density (TRD), ramps/mi	-		
-	Free-Flow Speed (FFS), mi/h	75.0		
-				
Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
No Incident	Demand Adjustment Factor (DAF)	1.000		
-		•		
1884	Heavy Vehicle Adjustment Factor (fHV)	0.971		
0.95	Flow Rate (Vp), pc/h/ln	1021		
3.00	Capacity (c), pc/h/ln	2400		
-	Adjusted Capacity (cadj), pc/h/ln	2352		
-	Volume-to-Capacity Ratio (v/c)	0.43		
2.00				
-		-		
-	Average Speed (S), mi/h	73.5		
-	Density (D), pc/mi/ln	13.9		
-	Level of Service (LOS)	В		
73.5				
	CDM Smith CDM Smith Orange County Upstream of SR 520 off-ramp 2	CDM Smith Date CDM Smith Analysis Year Orange County Time Analyzed Upstream of SR 520 off-ramp 2 Terrain Type - Percent Grade, % Measured Grade Length, mi - Total Ramp Density (TRD), ramps/mi - Free-Flow Speed (FFS), mi/h - Mostly Familiar Final Speed Adjustment Factor (SAF) Non-Severe Weather Final Capacity Adjustment Factor (CAF) No Incident Demand Adjustment Factor (DAF) 1884 Heavy Vehicle Adjustment Factor (fHv) 0.95 Flow Rate (Vp), pc/h/ln 3.00 Capacity (c), pc/h/ln - Adjusted Capacity (cadj), pc/h/ln - Volume-to-Capacity Ratio (v/c) 2.00 - Average Speed (S), mi/h - Density (D), pc/mi/ln - Level of Service (LOS)		

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	ŀ	HCS7 Freeway	Diverge Report			
Project Information						
Analyst	CDM Smith	า	Date	1/24/2023		
Agency	CDM Smith	า	Analysis Year	2022		
Jurisdiction	Orange Co	unty	Time Analyzed	Existing PN	Л Peak	
Project Description	Upstream (of SR 520 off-ramp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration L	ength (LA),	ft	1500	230		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familiar		
Weather Type		Non-Severe Weather	Non-Sever	e Weather		
Incident Type			No Incident	-	-	
Final Speed Adjustment Factor (SAF))		0.980	0.980		
Final Capacity Adjustment Factor (Ca	AF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Demand and Capacity				·		
Demand Volume (Vi)			1884	139		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00		
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-	-	
Heavy Vehicle Adjustment Factor (f	IV)		0.971	0.971	0.971	
Flow Rate (vi),pc/h			2042	151	151	
Capacity (c), pc/h			4704	2058	2058	
Volume-to-Capacity Ratio (v/c)	Volume-to-Capacity Ratio (v/c)		0.43	0.07	0.07	
Speed and Density						
Upstream Equilibrium Distance (LEQ)), ft	-	Number of Outer Lanes on Fi	reeway (No)	0	
Distance to Upstream Ramp (LUP), ft	t	-	Speed Index (Ds)		0.323	
Downstream Equilibrium Distance (L	EQ), ft	-	Flow Outer Lanes (vOA), pc/h,	/ln	-	
Distance to Downstream Ramp (LDC	WN), ft	-	Off-Ramp Influence Area Spe	eed (SR), mi/h	63.3	
Prop. Freeway Vehicles in Lane 1 and	d 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h		80.6	
Flow in Lanes 1 and 2 (v12), pc/h		2042	Ramp Junction Speed (S), mi,	/h	63.3	
Flow Entering Ramp-Infl. Area (vR12)), pc/h	-	Average Density (D), pc/mi/lr	1	16.1	
Level of Service (LOS)		В	Density in Ramp Influence Ar	<u> </u>	19.7	

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/17/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	SR 520 off-ramp to on- ramp	Units	U.S. Customary
Geometric Data			
Number of Lanes, In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	1745	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	946
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.40
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	73.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	12.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	y Merge Report			
Project Information						
Analyst	CDM Smitl	า	Date	1/18/2023		
Agency	CDM Smitl	า	Analysis Year	2022		
Jurisdiction	Orange Co	ounty	Time Analyzed	Existing PN	M Peak	
Project Description	SR 520 on- Boulevard	ramp to Dallas on-ramp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			2	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Acceleration	Length (LA),	ft	1500	640		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population		All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	re Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SAI	=)		0.980	0.980		
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi)			1745	185		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			1892	201		
Capacity (c), pc/h			4704	2058	2058	
Volume-to-Capacity Ratio (v/c)			0.44	0.10		
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	0	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (MS)		0.296	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln -		-	
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h 64.		64.2	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	1.000	Outer Lanes Freeway Speed (So), mi/h 73.5		73.5	
Flow in Lanes 1 and 2 (v12), pc/h		1892	Ramp Junction Speed (S), mi/h		64.2	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2093	Average Density (D), pc/mi/ln		16.3	
Level of Service (LOS)		В	Density in Ramp Influence Area (DR), pc/mi/ln 17.8		17.8	

HCS7 Basic Freeway Report Project Information					
Agency	CDM Smith	Analysis Year	2022		
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak		
Project Description	SR 520 on-ramp to Dallas Boulevard on-ramp	Units	U.S. Customary		
Geometric Data					
Number of Lanes, In	2	Terrain Type	Level		
Segment Length (L), ft	-	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-		
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	1930	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1046		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	73.5		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	14.2		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freeway	/ Merge Report		
Project Information					
Analyst	CDM Smit	n	Date	1/18/2023	
Agency	CDM Smit	n	Analysis Year	2022	
Jurisdiction	Orange Co	ounty	Time Analyzed	Existing PN	M Peak
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			2	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	825	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	r
Weather Type			Non-Severe Weather	Non-Sever	re Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SAI	=)		0.980	0.980	
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			1930	192	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			2092	208	
Capacity (c), pc/h			4704	2058	
Volume-to-Capacity Ratio (v/c)			0.49	0.10	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freev	way (No)	0
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms)		0.287
Downstream Equilibrium Distance ((LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		-
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed	(SR), mi/h	64.5
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO)	, mi/h	73.5
Flow in Lanes 1 and 2 (v12), pc/h		2092	Ramp Junction Speed (S), mi/h		64.5
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2300	Average Density (D), pc/mi/ln		17.8
Level of Service (LOS)		В	Density in Ramp Influence Area	(DR), pc/mi/ln	18.2

	HCS7 Basic Fr	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/17/2023
Agency	CDM Smith	Analysis Year	2022
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak
Project Description	Dallas Boulevard on-ramp to Innovation Way off- ramp	Units	U.S. Customary
Geometric Data			
Number of Lanes, In	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors	-		•
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	2122	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1150
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	73.3
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		İ

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		HCS7 Freeway	Diverge Report				
Project Information							
Analyst	CDM Smith	า	Date		1/18/2023		
Agency	CDM Smith	า	Analysis Year		2022		
Jurisdiction	Orange Co	ounty	Time Analyzed		Existing PM	1 Peak	
Project Description		levard on-ramp to Way off-ramp	Units		U.S. Custor	mary	
Geometric Data							
			Freeway		Ramp		
Number of Lanes (N), In			2		1		
Free-Flow Speed (FFS), mi/h			75.0		45.0		
Segment Length (L) / Deceleration	Length (LA),	ft	1500		270		
Terrain Type			Level		Level		
Percent Grade, %			-		-		
Segment Type / Ramp Type			Freeway		Right-Side	d One-Lane	
Adjustment Factors							
Driver Population			All Familiar		All Familiar		
Weather Type			Non-Severe Weather		Non-Sever	e Weather	
Incident Type			No Incident		-		
Final Speed Adjustment Factor (SAF	-)		0.980		0.980		
Final Capacity Adjustment Factor (C	AF)		0.980		0.980		
Demand Adjustment Factor (DAF)			1.000		1.000		
Demand and Capacity							
Demand Volume (Vi)			2122		62		
Peak Hour Factor (PHF)			0.95		0.95		
Total Trucks, %			3.00		3.00		
Single-Unit Trucks (SUT), %			-		-		
Tractor-Trailers (TT), %			-		-		
Heavy Vehicle Adjustment Factor (fi	⊣V)		0.971		0.971		
Flow Rate (vi),pc/h			2300		67		
Capacity (c), pc/h			4704		2058		
Volume-to-Capacity Ratio (v/c)			0.49		0.03		
Speed and Density							
Upstream Equilibrium Distance (LEC)), ft	-	Number of Outer Lanes or	n Freewa	y (No)	0	
Distance to Upstream Ramp (LUP), f	t	-	Speed Index (Ds)			0.316	
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (voa), po	c/h/ln		-	
Distance to Downstream Ramp (LDC	OWN), ft	-	Off-Ramp Influence Area	Speed (Sr	R), mi/h	63.5	
Prop. Freeway Vehicles in Lane 1 an	d 2 (PFD)	1.000	Outer Lanes Freeway Spee	ed (So), m	ni/h	80.6	
Flow in Lanes 1 and 2 (v12), pc/h		2300	Ramp Junction Speed (S),	mi/h		63.5	
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/m	ni/ln		18.1	
Level of Service (LOS)		С	Density in Ramp Influence	Area (Di	R), pc/mi/ln	21.6	

HCS7 Basic Freeway Report									
Project Information									
Analyst	CDM Smith	Date	1/17/2023						
Agency	CDM Smith	Analysis Year	2022						
Jurisdiction	Orange County	Time Analyzed	Existing PM Peak						
Project Description	Downstream of Innovation Way off-ramp	Units	U.S. Customary						
Geometric Data									
Number of Lanes, In	2	Terrain Type	Level						
Segment Length (L), ft	-	Percent Grade, %	-						
Measured or Base Free-Flow Speed	Measured	Grade Length, mi	-						
Base Free-Flow Speed (BFFS), mi/h	-	Total Ramp Density (TRD), ramps/mi	-						
Lane Width, ft	-	Free-Flow Speed (FFS), mi/h	75.0						
Right-Side Lateral Clearance, ft	-								
Adjustment Factors									
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980						
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980						
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000						
Demand and Capacity									
Demand Volume veh/h	2060	Heavy Vehicle Adjustment Factor (fHV)	0.971						
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1116						
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400						
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352						
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	73.4						
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.2						
Total Ramp Density Adjustment	-	Level of Service (LOS)	В						
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5								

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	٠	•	4	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	7	7		†	†	
Traffic Volume (vph)	110	113	0	108	11	0
Future Volume (vph)	110	113	0	108	11	0
Satd. Flow (prot)	1770	1583	0	1863	1863	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	1583	0	1863	1863	0
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%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	116	119	0	114	12	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utiliza	ation 18.4%			IC	CU Level	of Service

Analysis Period (min) 15

Synchro 11 Report Page 1

			_	_		,
		*	7	T	¥	*
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				4	f)	
Traffic Volume (vph)	0	0	93	125	11	452
Future Volume (vph)	0	0	93	125	11	452
Satd. Flow (prot)	0	0	0	1824	1617	0
Flt Permitted				0.979		
Satd. Flow (perm)	0	0	0	1824	1617	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
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)	001			001	001	
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)	^	0	0	227	F02	0
Lane Group Flow (vph)	0	0	0	237	503	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utiliza	ation 46.9%			IC	CU Level	of Service A
Analysis Period (min) 15						

Synchro 11 Report Page 2

	•	→	•	•	←	•	4	†	/	\	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	4	1	15	125	0	1	5	84	36	0	323	0
Future Volume (vph)	4	1	15	125	0	1	5	84	36	0	323	0
Satd. Flow (prot)	0	1656	0	0	1773	0	0	1787	0	0	1863	0
Flt Permitted		0.991			0.953			0.998				
Satd. Flow (perm)	0	1656	0	0	1773	0	0	1787	0	0	1863	0
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 (%)	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%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	21	0	0	137	0	0	135	0	0	351	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Control Type: Unsignalized Intersection Capacity Utilization 37.3%

Analysis Period (min) 15

ICU Level of Service A

Synchro 11 Report Page 3

Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	6:30	6:30	6:30	6:30	6:30	6:30	6:30
End Time	9:00	9:00	9:00	9:00	9:00	9:00	9:00
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	1620	1663	1558	1560	1649	1589	1682
Vehs Exited	1617	1668	1558	1570	1648	1599	1688
Starting Vehs	25	26	19	26	22	22	21
Ending Vehs	28	21	19	16	23	12	15
Travel Distance (mi)	1229	1264	1182	1184	1246	1205	1270
Travel Time (hr)	39.1	40.2	37.4	37.7	39.6	38.1	40.6
Total Delay (hr)	5.6	5.7	5.2	5.4	5.6	5.3	5.8
Total Stops	1453	1473	1380	1371	1432	1364	1482
Fuel Used (gal)	51.8	54.3	50.2	51.1	53.6	51.9	54.7

Summary of All Intervals

Run Number	8	9	10	Avg	
Start Time	6:30	6:30	6:30	6:30	
End Time	9:00	9:00	9:00	9:00	
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	1627	1596	1606	1615	
Vehs Exited	1631	1602	1597	1617	
Starting Vehs	20	23	12	20	
Ending Vehs	16	17	21	16	
Travel Distance (mi)	1230	1211	1205	1223	
Travel Time (hr)	39.3	38.5	38.1	38.9	
Total Delay (hr)	5.7	5.4	5.4	5.5	
Total Stops	1445	1420	1395	1422	
Fuel Used (gal)	52.6	51.8	51.3	52.3	

Interval #0 Information Seeding

Start Time	6:30	
End Time	7:00	
Total Time (min)	30	
Volumes adjusted by	Growth Factors.	
No data recorded this	interval.	

Interval #1 Information Recording

Start Time	7:00		
End Time	9:00		
Total Time (min)	120		
Volumes adjusted by Grov	wth Factors.		

Run Number	1	2	3	4	5	6	7
Vehs Entered	1620	1663	1558	1560	1649	1589	1682
Vehs Exited	1617	1668	1558	1570	1648	1599	1688
Starting Vehs	25	26	19	26	22	22	21
Ending Vehs	28	21	19	16	23	12	15
Travel Distance (mi)	1229	1264	1182	1184	1246	1205	1270
Travel Time (hr)	39.1	40.2	37.4	37.7	39.6	38.1	40.6
Total Delay (hr)	5.6	5.7	5.2	5.4	5.6	5.3	5.8
Total Stops	1453	1473	1380	1371	1432	1364	1482
Fuel Used (gal)	51.8	54.3	50.2	51.1	53.6	51.9	54.7

Interval #1 Information Recording

Start Time	7:00		
End Time	9:00		
Total Time (min)	120		
Volumes adjusted by Grov	wth Factors.		

Run Number	8	9	10	Avg	
Vehs Entered	1627	1596	1606	1615	
Vehs Exited	1631	1602	1597	1617	
Starting Vehs	20	23	12	20	
Ending Vehs	16	17	21	16	
Travel Distance (mi)	1230	1211	1205	1223	
Travel Time (hr)	39.3	38.5	38.1	38.9	
Total Delay (hr)	5.7	5.4	5.4	5.5	
Total Stops	1445	1420	1395	1422	
Fuel Used (gal)	52.6	51.8	51.3	52.3	

Intersection: 1: SR 528 EB Ramps & Dallas Boulevard

Movement	EB
Directions Served	L
Maximum Queue (ft)	66
Average Queue (ft)	29
95th Queue (ft)	47
Link Distance (ft)	1607
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Dallas Boulevard & SR 528 WB Ramps

Movement	NB
Directions Served	LT
Maximum Queue (ft)	38
Average Queue (ft)	2
95th Queue (ft)	14
Link Distance (ft)	569
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Starry Street & Dallas Boulevard

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	42	87	66	105
Average Queue (ft)	15	38	33	53
95th Queue (ft)	40	62	48	80
Link Distance (ft)	972	978	253	1246
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

	•	•	4	†	↓	1
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	ሻ	7		†	1	
Traffic Volume (vph)	345	6	0	52	4	0
Future Volume (vph)	345	6	0	52	4	0
Satd. Flow (prot)	1770	1583	0	1863	1863	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	1583	0	1863	1863	0
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%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	363	6	0	55	4	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Control Type: Unsignalized						

Control Type: Unsignalized Intersection Capacity Utilization 29.1%

ICU Level of Service A

Analysis Period (min) 15

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	٠	•	•	†	ļ	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				ર્ન	f)	
Traffic Volume (vph)	0	0	26	371	4	166
Future Volume (vph)	0	0	26	371	4	166
Satd. Flow (prot)	0	0	0	1857	1617	0
Flt Permitted				0.997		
Satd. Flow (perm)	0	0	0	1857	1617	0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
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%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	431	184	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Control Type: Unsignalized	d					
Intersection Capacity Utiliz	ation 38.1%			IC	U Level	of Service

Analysis Period (min) 15

alysis Periou (IIIII) 15

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	•	→	•	•	←	•	•	†	<i>></i>	\	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	1	1	9	43	1	2	13	248	110	1	118	4
Future Volume (vph)	1	1	9	43	1	2	13	248	110	1	118	4
Satd. Flow (prot)	0	1646	0	0	1770	0	0	1785	0	0	1855	0
Flt Permitted		0.996			0.955			0.998				
Satd. Flow (perm)	0	1646	0	0	1770	0	0	1785	0	0	1855	0
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 (%)	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%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	12	0	0	50	0	0	404	0	0	133	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Control Type: Unsignalized Intersection Capacity Utilization 44.5%

ICU Level of Service A

Analysis Period (min) 15

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Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	4:30	4:30	4:30	4:30	4:30	4:30	4:30
End Time	7:00	7:00	7:00	7:00	7:00	7:00	7:00
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	1122	1180	1214	1169	1119	1216	1206
Vehs Exited	1125	1182	1218	1174	1116	1225	1210
Starting Vehs	19	17	16	18	15	19	15
Ending Vehs	16	15	12	13	18	10	11
Travel Distance (mi)	901	960	980	945	901	983	976
Travel Time (hr)	28.7	30.9	31.6	30.2	28.8	31.4	31.1
Total Delay (hr)	4.9	5.6	5.7	5.3	4.9	5.6	5.6
Total Stops	1690	1849	1858	1788	1706	1856	1839
Fuel Used (gal)	35.2	37.8	38.2	37.3	35.3	38.8	38.0

Summary of All Intervals

Run Number	8	9	10	Avg
Start Time	4:30	4:30	4:30	4:30
End Time	7:00	7:00	7:00	7:00
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	1176	1192	1212	1182
Vehs Exited	1180	1191	1206	1183
Starting Vehs	17	18	13	16
Ending Vehs	13	19	19	13
Travel Distance (mi)	950	956	977	953
Travel Time (hr)	30.4	30.5	31.2	30.5
Total Delay (hr)	5.3	5.3	5.6	5.4
Total Stops	1782	1799	1859	1803
Fuel Used (gal)	37.4	38.1	38.2	37.4

Interval #0 Information Seeding

Start Time	4:30
End Time	5:00
Total Time (min)	30
Volumes adjusted by Grow	th Factors.
No data recorded this inter-	val.

Interval #1	Info	ormation	Reco	rdina
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Start Time	5:00	
End Time	7:00	
Total Time (min)	120	
Volumes adjusted by Gro	wth Factors.	

Run Number	1	2	3	4	5	6	7
Vehs Entered	1122	1180	1214	1169	1119	1216	1206
Vehs Exited	1125	1182	1218	1174	1116	1225	1210
Starting Vehs	19	17	16	18	15	19	15
Ending Vehs	16	15	12	13	18	10	11
Travel Distance (mi)	901	960	980	945	901	983	976
Travel Time (hr)	28.7	30.9	31.6	30.2	28.8	31.4	31.1
Total Delay (hr)	4.9	5.6	5.7	5.3	4.9	5.6	5.6
Total Stops	1690	1849	1858	1788	1706	1856	1839
Fuel Used (gal)	35.2	37.8	38.2	37.3	35.3	38.8	38.0

Interval #1 Information Recording

Start Time	5:00	
End Time	7:00	
Total Time (min)	120	
Volumes adjusted b	y Growth Factors.	

Run Number	8	9	10	Avg	
Vehs Entered	1176	1192	1212	1182	
Vehs Exited	1180	1191	1206	1183	
Starting Vehs	17	18	13	16	
Ending Vehs	13	19	19	13	
Travel Distance (mi)	950	956	977	953	
Travel Time (hr)	30.4	30.5	31.2	30.5	
Total Delay (hr)	5.3	5.3	5.6	5.4	
Total Stops	1782	1799	1859	1803	
Fuel Used (gal)	37.4	38.1	38.2	37.4	

Intersection: 1: SR 528 EB Ramps & Dallas Boulevard

Movement	EB
Directions Served	L
Maximum Queue (ft)	109
Average Queue (ft)	50
95th Queue (ft)	80
Link Distance (ft)	1607
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Dallas Boulevard & SR 528 WB Ramps

Movement	NB
Directions Served	LT
Maximum Queue (ft)	3
Average Queue (ft)	0
95th Queue (ft)	3
Link Distance (ft)	569
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Starry Street & Dallas Boulevard

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	38	62	90	68
Average Queue (ft)	8	25	41	34
95th Queue (ft)	31	48	65	52
Link Distance (ft)	972	978	253	1246
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0



Appendix B

Future Conditions Analysis:

- HCS Reports
- SIDRA Reports
- Synchro/SimTraffic Reports

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak
Project Description	Upstream of Innovation Way 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3460	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1250
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.53
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	72.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freewa	y Merge Report			
Project Information						
Analyst	nalyst CDM Smith		Date	1/26/2023		
Agency	CDM Smit	า	Analysis Year	2030		
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build A	M Peak	
Project Description	roject Description Innovation Way on-ramp to Dallas Boulevard off-ramp			U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Acceleration	Length (LA),	ft	1500	908		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SA	=)		0.980	0.980		
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			3460	110		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00		
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			3751	119		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)		0.55	0.06			
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms)		0.283	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1489	
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	64.6	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.603	Outer Lanes Freeway Speed (SO),	mi/h	69.9	
Flow in Lanes 1 and 2 (v12), pc/h		2262	Ramp Junction Speed (S), mi/h		66.5	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2381	Average Density (D), pc/mi/ln		19.4	
Level of Service (LOS)		В	Density in Ramp Influence Area (DR), pc/mi/ln 18.4			

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak
Project Description	Innovation Way on-ramp to Dallas Boulevard 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity	-		
Demand Volume veh/h	3570	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1290
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	72.6
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Diverge Report		
Project Information					
Analyst	nalyst CDM Smith		Date	1/26/2023	
Agency	CDM Smit	า	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build A	M Peak
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custo	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	ft	1500	825	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	r
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SAI	=)		0.980	0.980	
Final Capacity Adjustment Factor (C	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			3570	260	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			3870	282	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)		0.55	0.14		
Speed and Density					
Upstream Equilibrium Distance (LEC	Q), ft	-	Number of Outer Lanes on Freewa	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (DS)		0.335
Downstream Equilibrium Distance ((LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1256
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed (S	SR), mi/h	62.9
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.650	Outer Lanes Freeway Speed (SO),	mi/h	79.6
Flow in Lanes 1 and 2 (v12), pc/h		2614	Ramp Junction Speed (S), mi/h		67.5
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		19.1
Level of Service (LOS)		В	Density in Ramp Influence Area (DR), pc/mi/ln 19.3		

	HCS7 Basic Fr	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak
Project Description	Dallas Boulevard off-ramp to SR 520 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			-
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3310	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1196
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	73.1
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date	1/26/2023	1/26/2023	
Agency	CDM Smit	h	Analysis Year	2030		
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build A	M Peak	
Project Description	Dallas Bou 520 off-rai	llevard off-ramp to SR mp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	45.0	
Segment Length (L) / Deceleration Length (LA),ft			1500	240	240	
Terrain Type			Level	Level	Level	
Percent Grade, %			-	-	-	
Segment Type / Ramp Type			Freeway	Right-Side	Right-Sided One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	All Familiar	
Weather Type	Weather Type			Non-Sever	Non-Severe Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SAI	=)		0.980	0.980		
Final Capacity Adjustment Factor (CAF)			0.980	0.980		
Demand Adjustment Factor (DAF)	Demand Adjustment Factor (DAF)			1.000		
Demand and Capacity						
Demand Volume (Vi)			3310	560		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00		
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (fHV)			0.971	0.971		
Flow Rate (vi),pc/h			3588	607		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)		0.51	0.29			
Speed and Density						
Upstream Equilibrium Distance (LEC	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.364	
Downstream Equilibrium Distance (LEQ), ft -		Flow Outer Lanes (vOA), pc/h/ln		1067		
Distance to Downstream Ramp (LDOWN), ft 2091		Off-Ramp Influence Area Speed (SR), mi/h		62.0		
Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.642		Outer Lanes Freeway Speed (SO), mi/h		80.4		
Flow in Lanes 1 and 2 (v12), pc/h 2521		Ramp Junction Speed (S), mi/h		66.5		
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		18.0	
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 23.8		23.8	

HCS7 Basic Freeway Report Project Information						
Agency	CDM Smith	Analysis Year	2030			
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak			
Project Description	SR 520 off-ramp to 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	75.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors						
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980			
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980			
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000			
Demand and Capacity						
Demand Volume veh/h	2750	Heavy Vehicle Adjustment Factor (fHV)	0.971			
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	994			
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352			
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.42			
Passenger Car Equivalent (ET)	2.00					
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	73.5			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	13.5			
Total Ramp Density Adjustment	-	Level of Service (LOS)	В			
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5					

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	HCS7 Freeway Merge Report				
Project Information					
	DM Smith	Date	1/26/2023		
Agency C	DM Smith	Analysis Year	2030		
Jurisdiction C	Prange County	Time Analyzed	No Build A	M Peak	
Project Description D	ownstream of SR 520 on-ramp	Units	U.S. Custor	mary	
Geometric Data			<u> </u>		
		Freeway	Ramp		
Number of Lanes (N), In		3	1		
Free-Flow Speed (FFS), mi/h		75.0	45.0		
Segment Length (L) / Acceleration Le	ngth (LA),ft	1500	390		
Terrain Type		Level	Level		
Percent Grade, %		-	-		
Segment Type / Ramp Type		Freeway	Right-Side	d One-Lane	
Adjustment Factors					
Driver Population		All Familiar	All Familiar		
Weather Type		Non-Severe Weather	Non-Sever	Non-Severe Weather	
Incident Type		No Incident	-	-	
Final Speed Adjustment Factor (SAF)		0.980	0.980		
Final Capacity Adjustment Factor (CA	F)	0.980	0.980		
Demand Adjustment Factor (DAF)		1.000	1.000		
Demand and Capacity					
Demand Volume (Vi)		2750	240		
Peak Hour Factor (PHF)		0.95	0.95		
Total Trucks, %		3.00	3.00		
Single-Unit Trucks (SUT), %		-	-		
Tractor-Trailers (TT), %		-	-		
Heavy Vehicle Adjustment Factor (fhv	')	0.971	0.971		
Flow Rate (vi),pc/h		2981	260		
Capacity (c), pc/h		7056	2058		
Volume-to-Capacity Ratio (v/c)		0.46	0.13		
Speed and Density					
Upstream Equilibrium Distance (LEQ),	ft 771.1	Number of Outer Lanes on Freewa	ay (No)	1	
Distance to Upstream Ramp (LUP), ft	2091	Speed Index (Ms)		0.316	
Downstream Equilibrium Distance (LE	Q), ft -	Flow Outer Lanes (vOA), pc/h/ln		1228	
Distance to Downstream Ramp (LDOV	vn), ft -	On-Ramp Influence Area Speed (SR), mi/h		63.5	
Prop. Freeway Vehicles in Lane 1 and	2 (PFM) 0.588	Outer Lanes Freeway Speed (SO), mi/h 70		70.9	
Flow in Lanes 1 and 2 (v12), pc/h	1753	Ramp Junction Speed (S), mi/h 66.		66.1	
Flow Entering Ramp-Infl. Area (vR12),	pc/h 2013	Average Density (D), pc/mi/ln		16.3	
Level of Service (LOS)	В	Density in Ramp Influence Area (D	PR), pc/mi/ln	18.7	

	HCS7 Basic F	reeway Report		
Project Information				
Analyst	CDM Smith	Date	1/26/2023	
Agency	CDM Smith	Analysis Year	2030	
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak	
Project Description	Downstream of SR 520 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	75.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980	
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980	
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000	
Demand and Capacity				
Demand Volume veh/h	2990	Heavy Vehicle Adjustment Factor (fHV)	0.971	
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1080	
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352	
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.46	
Passenger Car Equivalent (ET)	2.00			
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	73.5	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	14.7	
Total Ramp Density Adjustment	-	Level of Service (LOS)	В	
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5			

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	HCS7 Basic Freeway Report				
Project Information					
Analyst	CDM Smith	Date	1/26/2023		
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak		
Project Description	Upstream of SR 520 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity	-				
Demand Volume veh/h	3500	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1265		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	72.8		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.4		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				
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Project Information CDM Smith Date 1/26/2023 Analyst CDM Smith Analysis Year 2030 Agency CDM Smith Analysis Year 2030 Jurisdiction Orange County Time Analyzed No Build AM Peak Project Description Upstream of SR 520 off-ramp Units U.S. Customary Geometric Data Freework Ramp Image: County Signature Number of Lanes (N). In 3 1 1 Free-Flow Speed (FFS), mi/h 3 1 1 Segment Type Level Level Level Percent Grade, % - - - Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Non-Severe Weather Non-Severe Weather Non-Severe Weather Inclident Type Non-Severe Weather Non-Severe Weather Non-Severe Weather </th <th></th> <th>ı</th> <th>HCS7 Freeway</th> <th>Diverge Report</th> <th></th> <th></th>		ı	HCS7 Freeway	Diverge Report			
Agency CDM Smith Analysis Year 2030 Jurisdiction Orange County Time Analyzed No Build AM Peak Project Description Upstream of SR 520 off-ramp Units U.S. Customary Geometric Data Free-Flow Speed (FFS), mi/h 3	Project Information						
Durisdiction Orange County Time Analyzed No Build AM Peak	Analyst	CDM Smith	า	Date	1/26/2023		
Project Description Upstream of SR 520 off-ramp Units U.S. Customary	Agency	CDM Smith	า	Analysis Year	2030		
Freeway	Jurisdiction	Orange Co	unty	Time Analyzed	No Build A	M Peak	
Freeway Ramp Number of Lanes (N), In 3 1	Project Description	Upstream	of SR 520 off-ramp	Units	U.S. Custo	mary	
Number of Lanes (N), In 3 1 Free-Flow Speed (FFS), mi/h 75.0 45.0 Segment Length (L) / Deceleration Length (LA),ft 1500 230 Terrain Type Level Level Fercent Grade, % - - Segment Type / Ramp Type Remay Right-Sided One-Lane Adjustment Factors All Familiar All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Non-Severe Weather Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Demand Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Adjustment Factor (PAF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - 0.971 Heavy Vehicle Adjustment Factor (HN) 0.971 0.971 Flow Rate (N)pC/h 3794 141 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (w/c) 0.54 0.07 Speed and Density Upstream Equilibrium Distance (LEO), ft - Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LEO), ft - Speed Index (NO), pc/h/ln 1246 Distance to Downstream Ramp (LEO), ft - Flow Outer Lanes (NO), pc/h/ln 68.0 Flow in Lanes 1 and 2 (V12), pc/h 2548 Ramp Junction Speed (S), mi/h 68.0 Flow in Lanes 1 and 2 (V12), pc/h - Average Density (D), pc/mi/ln 18.6	Geometric Data						
Free-Flow Speed (FFS), mi/h Segment Length (L) / Deceleration Length (LA)ft 1500 230 Terrain Type Level Level Level Percent Grade, % Segment Type / Ramp Type Freeway All Familiar All Familiar All Familiar Mon-Severe Weather Non-Severe Weather Non-Se				Freeway	Ramp		
Segment Length (L) / Deceleration Length (LA),ft 1500 230 Terrain Type Level Level Percent Grade, % - - Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (DAF) 0.980 0.980 Demand Capacity Demand Volume (V) 3500 130 Demand Equilibritum Type (DAF) 0.95 0.95<	Number of Lanes (N), In			3	1		
Level Level Level Level Percent Grade, %	Free-Flow Speed (FFS), mi/h			75.0	45.0		
Percent Grade, % -	Segment Length (L) / Deceleration I	Length (LA),	ft	1500	230		
Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0,980 0,980 Final Capacity Adjustment Factor (CAF) 0,980 0,980 Demand Adjustment Factor (DAF) 0,980 0,980 Demand Adjustment Factor (DAF) 1,000 0,980 Demand Volume (VI) 3500 130 Demand Volume (VI) 3500 130 Demand Volume (VI) 0,95 0,95 Total Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0,971 0,971 Heavy Vehicle Adjustment Factor (fHv) 0,971 0,971 Flow (VI), pc/h 3794 141 Capacity Ratio (Terrain Type			Level	Level		
Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (DAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Capacity Demand Volume (Vi) 3500 130 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, SUTD, % - - Tractor-Trailers (TT), % - - Flow Rate (vi), pc/h 3794 141 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.54 0.07 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) 0.322 Downstream Equilibriu	Percent Grade, %			-	-		
All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0,980 0,980 Final Capacity Adjustment Factor (DAF) 0,980 0,980 Demand Adjustment Factor (DAF) 1,000 1,000 Demand Capacity Demand Volume (Vi) 3500 130 Peak Hour Factor (PHF) 0,95 0,95 Total Trucks, % 3,00 3,00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0,971 0,971 Flow Rate (wi),pc/h 3794 141 Capacity (c), pc/h 756 2058 Volume-to-Capacity Ratio (w/c) 0,54 0,07 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) 0,322 </td <td>Segment Type / Ramp Type</td> <td></td> <td></td> <td>Freeway</td> <td>Right-Side</td> <td>d One-Lane</td>	Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Non-Severe Weather Non-Severe Weather Non-Severe Weather	Adjustment Factors						
Incident Type	Driver Population			All Familiar	All Familia	r	
Final Speed Adjustment Factor (SAF) 0.980 0.980 0.980	Weather Type		Non-Severe Weather	Non-Sever	Non-Severe Weather		
Final Capacity Adjustment Factor (CAF) 0.980 0.980	Incident Type			No Incident	-		
Demand Adjustment Factor (DAF) 1.000 1.000 Demand and Capacity Demand Volume (Vi) 3500 130 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHvV) 0.971 0.971 Flow Rate (vi),pc/h 3794 141 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.54 0.07 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) 0.322 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1246 Distance to Downstream Ramp (LuP), ft - Flow Outer Lanes Freeway Speed (SR), mi/h 63.4 Prop. Freeway Vehicl	Final Speed Adjustment Factor (SAF	·)		0.980	0.980		
Demand and Capacity Demand Volume (V) 3500 130 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi),pc/h 3794 141 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.54 0.07 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) 0.322 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (voa), pc/h/In 1246 Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (SR), mi/h 63.4 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.659 Outer Lanes Freeway Speed (SO), mi/h 79.7 Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln	Final Capacity Adjustment Factor (C	AF)		0.980	0.980		
Demand Volume (Vi) 3500 130 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi), pc/h 3794 141 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.54 0.07 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) 0.322 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1246 Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (Sn), mi/h 63.4 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.659 Outer Lanes Freeway Speed (SO), mi/h 79.7 Flow in Lanes 1 and 2 (v12), pc/h 2548 Ramp Junction Speed (S), mi/h 68.0 Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln	Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHV) 0.971 0.971 Flow Rate (w), pc/h 3794 141 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.54 0.07 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) 0.322 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1246 Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (SR), mi/h 63.4 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.659 Outer Lanes Freeway Speed (SO), mi/h 79.7 Flow in Lanes 1 and 2 (v12), pc/h 2548 Ramp Junction Speed (S), mi/h 68.0 Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln <	Demand and Capacity						
Total Trucks, % 3.00 3.00 3.00	Demand Volume (Vi)			3500	130		
Single-Unit Trucks (SUT), % - - - - - - - - -	Peak Hour Factor (PHF)			0.95	0.95		
Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHv) 0.971 3794 141 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 524 0.07 Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Ramp (LUP), ft Distance to Downstream Ramp (LDOWN), ft Distance to Downstream Ramp	Total Trucks, %			3.00	3.00		
Heavy Vehicle Adjustment Factor (fHv) Flow Rate (vi),pc/h Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Ramp (LUP), ft Distance to Downstream Ramp (LDOWN), ft Distance to Downstrea	Single-Unit Trucks (SUT), %			-	-	-	
Flow Rate (vi),pc/h Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Ramp (LUP), ft Distance to Upstream Equilibrium Distance (LEQ), ft Distance to Downstream Ramp (LDOWN), ft Distanc	Tractor-Trailers (TT), %			-	-	-	
Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Equilibrium Distance (LEQ), ft Distance to Downstream Ramp (LUP), ft Distance to Downstream Ramp (LDOWN), ft Distance to Downstream Ram	Heavy Vehicle Adjustment Factor (fi	⊣V)		0.971	0.971		
Volume-to-Capacity Ratio (v/c) 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) 0.322 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1246 Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (SR), mi/h 63.4 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.659 Outer Lanes Freeway Speed (SO), mi/h 79.7 Flow in Lanes 1 and 2 (v12), pc/h 2548 Ramp Junction Speed (S), mi/h 68.0 Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln 18.6	Flow Rate (vi),pc/h			3794	141		
Speed and DensityUpstream Equilibrium Distance (LEQ), ft-Number of Outer Lanes on Freeway (NO)1Distance to Upstream Ramp (LUP), ft-Speed Index (DS)0.322Downstream Equilibrium Distance (LEQ), ft-Flow Outer Lanes (vOA), pc/h/ln1246Distance to Downstream Ramp (LDOWN), ft2091Off-Ramp Influence Area Speed (SR), mi/h63.4Prop. Freeway Vehicles in Lane 1 and 2 (PFD)0.659Outer Lanes Freeway Speed (SO), mi/h79.7Flow in Lanes 1 and 2 (v12), pc/h2548Ramp Junction Speed (S), mi/h68.0Flow Entering Ramp-Infl. Area (vR12), pc/h-Average Density (D), pc/mi/ln18.6	Capacity (c), pc/h		7056	2058	2058		
Upstream Equilibrium Distance (LEQ), ft - Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft - Speed Index (DS) 0.322 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1246 Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (SR), mi/h 63.4 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.659 Outer Lanes Freeway Speed (SO), mi/h 79.7 Flow in Lanes 1 and 2 (v12), pc/h 2548 Ramp Junction Speed (S), mi/h 68.0 Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln 18.6	Volume-to-Capacity Ratio (v/c)		0.54	0.07			
Distance to Upstream Ramp (LUP), ft - Speed Index (DS) Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1246 Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (SR), mi/h 63.4 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.659 Outer Lanes Freeway Speed (SO), mi/h 79.7 Flow in Lanes 1 and 2 (v12), pc/h 2548 Ramp Junction Speed (S), mi/h 68.0 Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln 18.6	Speed and Density						
Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1246 Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (SR), mi/h 63.4 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.659 Outer Lanes Freeway Speed (SO), mi/h 79.7 Flow in Lanes 1 and 2 (v12), pc/h 2548 Ramp Junction Speed (S), mi/h 68.0 Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln 18.6	Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Free	way (No)	1	
Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (SR), mi/h 63.4 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) Outer Lanes Freeway Speed (SO), mi/h Flow in Lanes 1 and 2 (v12), pc/h Ramp Junction Speed (S), mi/h 68.0 Flow Entering Ramp-Infl. Area (vR12), pc/h Average Density (D), pc/mi/ln 18.6	Distance to Upstream Ramp (LUP), f	t	-	Speed Index (DS)		0.322	
Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.659 Outer Lanes Freeway Speed (SO), mi/h 79.7 Flow in Lanes 1 and 2 (v12), pc/h 2548 Ramp Junction Speed (S), mi/h 68.0 Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln 18.6	Downstream Equilibrium Distance (l	LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1246	
Flow in Lanes 1 and 2 (v12), pc/h 2548 Ramp Junction Speed (S), mi/h 68.0 Flow Entering Ramp-Infl. Area (vR12), pc/h Average Density (D), pc/mi/ln 18.6	Distance to Downstream Ramp (LDC	OWN), ft	2091	Off-Ramp Influence Area Speed (SR), mi/h		63.4	
Flow Entering Ramp-Infl. Area (vR12), pc/h Average Density (D), pc/mi/ln 18.6	Prop. Freeway Vehicles in Lane 1 an	d 2 (PFD)	0.659	Outer Lanes Freeway Speed (SO), mi/h		79.7	
	Flow in Lanes 1 and 2 (v12), pc/h		2548	Ramp Junction Speed (S), mi/h		68.0	
Level of Service (LOS) C Density in Ramp Influence Area (DR), pc/mi/ln 24.1	Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln		18.6	
	Level of Service (LOS)		С	Density in Ramp Influence Area	(DR), pc/mi/ln	24.1	

	HCS7 Basic F	reeway Report		
Project Information				
Analyst	CDM Smith	Date	1/26/2023	
Agency	CDM Smith	Analysis Year	2030	
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak	
Project Description	SR 520 off-ramp to 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	75.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980	
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980	
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000	
Demand and Capacity				
Demand Volume veh/h	3370	Heavy Vehicle Adjustment Factor (fHV)	0.971	
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1218	
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352	
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	73.0	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.7	
Total Ramp Density Adjustment	-	Level of Service (LOS)	В	
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5			

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		HCS7 Freewa	y Merge Report		
Project Information					
Analyst	CDM Smitl	า	Date	1/26/2023	
Agency	CDM Smitl	า	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build A	M Peak
Project Description	SR 520 on- Boulevard	ramp to Dallas on-ramp	Units	U.S. Custor	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	640	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familiar	•
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SAI	=)		0.980	0.980	
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			3370	360	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			3653	390	
Capacity (c), pc/h		7056	2058		
Volume-to-Capacity Ratio (v/c)			0.57	0.19	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	1053.7	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	2091	Speed Index (MS)		0.315
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1479
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h		63.6
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.595	Outer Lanes Freeway Speed (SO), mi/h 70		70.0
Flow in Lanes 1 and 2 (v12), pc/h		2174	Ramp Junction Speed (S), mi/h 65.8		65.8
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2564	Average Density (D), pc/mi/ln		20.5
Level of Service (LOS)		С	Density in Ramp Influence Area (I	DR), pc/mi/ln	21.4

HCS7 Basic Freeway Report Project Information				
CDM Smith	Analysis Year	2030		
Orange County	Time Analyzed	No Build AM Peak		
SR 520 on-ramp to Dallas Boulevard on-ramp	Units	U.S. Customary		
3	Terrain Type	Level		
-	Percent Grade, %	-		
Measured	Grade Length, mi	-		
-	Total Ramp Density (TRD), ramps/mi	-		
-	Free-Flow Speed (FFS), mi/h	75.0		
-				
Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
No Incident	Demand Adjustment Factor (DAF)	1.000		
3730	Heavy Vehicle Adjustment Factor (fHV)	0.971		
0.95	Flow Rate (V _p), pc/h/ln	1348		
3.00	Capacity (c), pc/h/ln	2400		
-	Adjusted Capacity (cadj), pc/h/ln	2352		
-	Volume-to-Capacity Ratio (v/c)	0.57		
2.00				
-	Average Speed (S), mi/h	72.2		
-	Density (D), pc/mi/ln	18.7		
-	Level of Service (LOS)	С		
73.5				
	CDM Smith CDM Smith Orange County SR 520 on-ramp to Dallas Boulevard on-ramp 3 - Measured Mostly Familiar Non-Severe Weather No Incident 3730 0.95 3.00 2.00	CDM Smith Date CDM Smith Analysis Year Orange County Time Analyzed SR 520 on-ramp to Dallas Boulevard on-ramp 3 Terrain Type - Percent Grade, % Measured Grade Length, mi - Total Ramp Density (TRD), ramps/mi - Free-Flow Speed (FFS), mi/h - Mostly Familiar Final Speed Adjustment Factor (SAF) Non-Severe Weather Final Capacity Adjustment Factor (CAF) No Incident Demand Adjustment Factor (DAF) 3730 Heavy Vehicle Adjustment Factor (DAF) 3730 Heavy Vehicle Adjustment Factor (FHV) - Adjusted Capacity (ca, pc/h/ln - Adjusted Capacity (cadj), pc/h/ln - Volume-to-Capacity Ratio (v/c) 2.00 - Average Speed (S), mi/h - Density (D), pc/mi/ln - Level of Service (LOS)		

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		HCS7 Freeway	/ Merge Report			
Project Information						
Analyst	CDM Smit	n	Date		1/26/2023	
Agency	CDM Smit	n	Analysis Year	2	2030	
Jurisdiction	Orange Co	unty	Time Analyzed	1	No Build A	M Peak
Project Description Dallas Boulevard on-ramp to Innovation Way off-ramp			Units	ı	U.S. Custor	mary
Geometric Data	•					
			Freeway	i	Ramp	
Number of Lanes (N), In			3	1	1	
Free-Flow Speed (FFS), mi/h			75.0	4	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	8	825	
Terrain Type			Level	ı	Level	
Percent Grade, %			-	-	-	
Segment Type / Ramp Type			Freeway	F	Right-Side	d One-Lane
Adjustment Factors						
Driver Population			All Familiar	,	All Familiar	
Weather Type			Non-Severe Weather	1	Non-Severe Weather	
Incident Type			No Incident	-	-	
Final Speed Adjustment Factor (SA	F)		0.980	(0.980	
Final Capacity Adjustment Factor (0	CAF)		0.980	(0.980	
Demand Adjustment Factor (DAF)			1.000	1	1.000	
Demand and Capacity						
Demand Volume (Vi)			3730 670			
Peak Hour Factor (PHF)			0.95	(0.95	
Total Trucks, %			3.00	3	3.00	
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	(0.971	
Flow Rate (vi),pc/h			4044	-	726	
Capacity (c), pc/h		7056	2	2058		
Volume-to-Capacity Ratio (v/c)			0.68	(0.35	
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes or	n Freeway	(No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (MS)			0.340
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 16 ²		1614	
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h		62.8	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.601	Outer Lanes Freeway Speed (SO), mi/h		69.5	
Flow in Lanes 1 and 2 (v12), pc/h		2430	Ramp Junction Speed (S), mi/h		64.9	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	3156	Average Density (D), pc/m	ni/ln		24.5
Level of Service (LOS)		С	Density in Ramp Influence	Area (DR),	, pc/mi/ln	24.7
S 11.00000111 1: (51.11.411						

	HCS7 Basic Fi	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak
Project Description	Dallas Boulevard on-ramp to Innovation Way 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity	-		
Demand Volume veh/h	4400	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1590
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	69.6
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	1/26/2023	
Agency	CDM Smit	h	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build A	M Peak
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custon	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	270	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors				•	
Driver Population			All Familiar	All Familia	
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			4400 150		
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			4770	163	
Capacity (c), pc/h		7056	2058		
Volume-to-Capacity Ratio (v/c)		0.68	0.08		
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (DS)		0.324
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1691
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h		63.3
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.633	Outer Lanes Freeway Speed (SO), mi/h		77.9
Flow in Lanes 1 and 2 (v12), pc/h		3079	Ramp Junction Speed (S), mi/h 67.		67.8
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		23.5
Level of Service (LOS)		D	Density in Ramp Influence Area (DR), pc/mi/ln 28.3		28.3

	HCS7 Basic Fr	eeway Report		
Project Information				
Analyst	CDM Smith	Date	1/26/2023	
Agency	CDM Smith	Analysis Year	2030	
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak	
Project Description	Downstream of Innovation Way 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	75.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980	
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980	
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000	
Demand and Capacity				
Demand Volume veh/h	4250	Heavy Vehicle Adjustment Factor (fHV)	0.971	
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1536	
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352	
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	70.3	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.8	
Total Ramp Density Adjustment	-	Level of Service (LOS)	С	
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5			

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	HCS7 Basic F	reeway Report		
Project Information				
Analyst	CDM Smith	Date	1/26/2023	
Agency	CDM Smith	Analysis Year	2030	
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak	
Project Description	Upstream of Innovation Way 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	75.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980	
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980	
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000	
Demand and Capacity				
Demand Volume veh/h	4140	Heavy Vehicle Adjustment Factor (fHV)	0.971	
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1496	
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352	
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	70.8	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.1	
Total Ramp Density Adjustment	-	Level of Service (LOS)	С	
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5			

HCSTM Freeways Version 7.9.6 2030 PM EB_1.xuf

		HCS7 Freewa	y Merge Report		
Project Information					
Analyst	CDM Smitl	า	Date	1/26/2023	
Agency	CDM Smitl	า	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build P	M Peak
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custor	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	908	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familiar	
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident		
Final Speed Adjustment Factor (SAI	=)		0.980	0.980	
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			4140 150		
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			4488	163	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.66	0.08	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms)		0.310
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1		1782
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h		63.7
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.603	Outer Lanes Freeway Speed (SO),	mi/h	68.9
Flow in Lanes 1 and 2 (v12), pc/h		2706	Ramp Junction Speed (S), mi/h 65.6		65.6
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2869	Average Density (D), pc/mi/ln		23.6
Level of Service (LOS)		С	Density in Ramp Influence Area (D	PR), pc/mi/ln	22.2

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	Innovation Way on-ramp to Dallas Boulevard 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4290	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1550
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.66
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.1
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	/ Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date	1/26/2023		
Agency	CDM Smit	h	Analysis Year	2030		
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build P	M Peak	
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custon	mary	
Geometric Data				·		
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration	Length (LA)	ft	1500	825		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			·			
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SA	F)		0.980	0.980		
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			4290	4290 560		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			4651	607		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)			0.66	0.29		
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.364	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1553	
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed (SR), mi,		62.0	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.616	Outer Lanes Freeway Speed (SO),	mi/h	78.5	
Flow in Lanes 1 and 2 (v12), pc/h		3098	Ramp Junction Speed (S), mi/h		66.7	
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		23.2	
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 23.5			

	HCS7 Basic Fr	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	Dallas Boulevard off-ramp to SR 520 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3730	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1348
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	72.2
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date	1/26/2023		
Agency	CDM Smit	h	Analysis Year	2030		
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build P	M Peak	
Project Description	Dallas Bou 520 off-rai	levard off-ramp to SR mp	Units	U.S. Custo	mary	
Geometric Data			·			
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	240		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	•	
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SAI	=)		0.980	0.980		
Final Capacity Adjustment Factor (C	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			3730 560			
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			4044	607		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)			0.57	0.29		
Speed and Density						
Upstream Equilibrium Distance (LEC	Ω), ft	-	Number of Outer Lanes on Freew	ay (No)	1	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.364	
Downstream Equilibrium Distance ((LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1268	
Distance to Downstream Ramp (LD	stance to Downstream Ramp (LDOWN), ft 2091		Off-Ramp Influence Area Speed (SR), mi/h	62.0	
Prop. Freeway Vehicles in Lane 1 ar	pp. Freeway Vehicles in Lane 1 and 2 (PFD) 0.631		Outer Lanes Freeway Speed (SO),	mi/h	79.6	
Flow in Lanes 1 and 2 (v12), pc/h		2776	Ramp Junction Speed (S), mi/h 66.6		66.6	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		20.2	
Level of Service (LOS)		С	Density in Ramp Influence Area ([DR), pc/mi/ln	26.0	

HCS7 Basic Freeway Report					
Project Information					
CDM Smith	Date	1/26/2023			
CDM Smith	Analysis Year	2030			
Orange County	Time Analyzed	No Build PM Peak			
SR 520 off-ramp to on- ramp	Units	U.S. Customary			
3	Terrain Type	Level			
-	Percent Grade, %	-			
Measured	Grade Length, mi	-			
-	Total Ramp Density (TRD), ramps/mi	-			
-	Free-Flow Speed (FFS), mi/h	75.0			
-					
Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980			
Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980			
No Incident	Demand Adjustment Factor (DAF)	1.000			
-		•			
3170	Heavy Vehicle Adjustment Factor (fHV)	0.971			
0.95	Flow Rate (V _p), pc/h/ln	1146			
3.00	Capacity (c), pc/h/ln	2400			
-	Adjusted Capacity (cadj), pc/h/ln	2352			
-	Volume-to-Capacity Ratio (v/c)	0.49			
2.00					
Speed and Density					
-	Average Speed (S), mi/h	73.3			
-	Density (D), pc/mi/ln	15.6			
-	Level of Service (LOS)	В			
73.5					
	CDM Smith CDM Smith Orange County SR 520 off-ramp to on-ramp 3 - Measured Mostly Familiar Non-Severe Weather No Incident 3170 0.95 3.00 2.00	CDM Smith Date CDM Smith Analysis Year Orange County Time Analyzed SR 520 off-ramp to on-ramp 3 Terrain Type - Percent Grade, % Measured Grade Length, mi - Total Ramp Density (TRD), ramps/mi - Free-Flow Speed (FFS), mi/h - Free-Flow Speed Adjustment Factor (SAF) Non-Severe Weather Final Capacity Adjustment Factor (CAF) No Incident Demand Adjustment Factor (DAF) 3170 Heavy Vehicle Adjustment Factor (fHv) 0.95 Flow Rate (Vp), pc/h/ln 3.00 Capacity (c), pc/h/ln - Adjusted Capacity (cadj), pc/h/ln - Volume-to-Capacity Ratio (v/c) 2.00 - Average Speed (S), mi/h - Density (D), pc/mi/ln - Level of Service (LOS)			

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		HCS7 Freeway	Merge Report			
Project Information						
Analyst	CDM Smith	1	Date	1/26/2023	}	
Agency	CDM Smith	1	Analysis Year	2030		
Jurisdiction	Orange Co	unty	Time Analyzed	No Build F	PM Peak	
Project Description	Downstrea	m of SR 520 on-ramp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Acceleration L	ength (LA),i	ft	1500	390		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	ed One-Lane	
Adjustment Factors				· ·		
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Seve	Non-Severe Weather	
Incident Type			No Incident	-	-	
Final Speed Adjustment Factor (SAF))		0.980	0.980		
Final Capacity Adjustment Factor (Ca	AF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Demand and Capacity				·		
Demand Volume (Vi)			3170 130			
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-	-	
Heavy Vehicle Adjustment Factor (f	IV)		0.971	0.971	0.971	
Flow Rate (vi),pc/h			3437	141	141	
Capacity (c), pc/h			7056	2058	2058	
Volume-to-Capacity Ratio (v/c)			0.51	0.07		
Speed and Density						
Upstream Equilibrium Distance (LEQ)), ft	843.2	Number of Outer Lanes on	Freeway (NO)	1	
Distance to Upstream Ramp (LUP), ft		2091	Speed Index (Ms)		0.320	
Downstream Equilibrium Distance (L	am Equilibrium Distance (LEQ), ft -		Flow Outer Lanes (vOA), pc/	/h/ln	1416	
Distance to Downstream Ramp (LDC	istance to Downstream Ramp (LDOWN), ft -		On-Ramp Influence Area S _l	peed (SR), mi/h	63.4	
Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588		Outer Lanes Freeway Speed (SO), mi/h		70.2		
Flow in Lanes 1 and 2 (v12), pc/h		2021	Ramp Junction Speed (S), n	ni/h	65.9	
Flow Entering Ramp-Infl. Area (vR12)	, pc/h	2162	Average Density (D), pc/mi,	/ln	18.1	
Level of Service (LOS)		В	Density in Ramp Influence	<u> </u>	19.9	

HCS7 Basic Freeway Report					
Project Information					
Analyst	CDM Smith	Date	1/26/2023		
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak		
Project Description	Downstream of SR 520 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity	-				
Demand Volume veh/h	3300	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1192		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	73.1		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.3		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	Upstream of SR 520 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3190	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1153
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	73.3
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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	Н	CS7 Freeway	Diverge Report			
Project Information						
Analyst CI	DM Smith		Date	1/26/2023		
Agency CI	DM Smith		Analysis Year	2030		
Jurisdiction O	range Cou	nty	Time Analyzed	No Build P	'M Peak	
Project Description U	pstream of	SR 520 off-ramp	Units	U.S. Custor	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration Ler	ngth (LA),ft		1500	230		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familiar	r	
Weather Type			Non-Severe Weather	Non-Sever	Non-Severe Weather	
Incident Type			No Incident	-	-	
Final Speed Adjustment Factor (SAF)			0.980	0.980		
Final Capacity Adjustment Factor (CAF	=)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Demand and Capacity				·		
Demand Volume (Vi)			3190	240		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-	-	
Heavy Vehicle Adjustment Factor (fHV))		0.971	0.971	0.971	
Flow Rate (vi),pc/h			3458	260		
Capacity (c), pc/h			7056	2058	2058	
Volume-to-Capacity Ratio (v/c)			0.49	0.13		
Speed and Density						
Upstream Equilibrium Distance (LEQ),	ft -		Number of Outer Lanes on Free	eway (No)	1	
Distance to Upstream Ramp (LUP), ft	-		Speed Index (DS)		0.333	
Downstream Equilibrium Distance (LEG	Q), ft -		Flow Outer Lanes (vOA), pc/h/ln		1081	
Distance to Downstream Ramp (LDOW	/N), ft 2	2091	Off-Ramp Influence Area Speed (SR), mi/h		63.0	
Prop. Freeway Vehicles in Lane 1 and 2	2 (PFD) ().662	Outer Lanes Freeway Speed (SO), mi/h		80.3	
Flow in Lanes 1 and 2 (v12), pc/h	2	2377	Ramp Junction Speed (S), mi/h 67.5		67.5	
Flow Entering Ramp-Infl. Area (vR12), p	pc/h -		Average Density (D), pc/mi/ln		17.1	
Level of Service (LOS)	(Density in Ramp Influence Area	(DR), pc/mi/ln	22.6	

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	SR 520 off-ramp to 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors	-		-
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	2950	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1066
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.45
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	73.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	14.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	y Merge Report			
Project Information	Project Information					
Analyst	CDM Smit	h	Date	1/26/2023		
Agency	CDM Smit	h	Analysis Year	2030		
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build P	M Peak	
Project Description	SR 520 on- Boulevard	-ramp to Dallas on-ramp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Acceleration	Length (LA),	ft	1500	640		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population		All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SA	F)		0.980	0.980		
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			2950	2950 360		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			3198	390		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)			0.51	0.19		
Speed and Density						
Upstream Equilibrium Distance (LEG	ე), ft	956.3	Number of Outer Lanes on Freew	ay (No)	1	
Distance to Upstream Ramp (LUP),	ft	2091	Speed Index (MS)		0.303	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1295		1295	
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h		64.0	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.595	Outer Lanes Freeway Speed (SO), mi/h 70.		70.6	
Flow in Lanes 1 and 2 (v12), pc/h		1903	Ramp Junction Speed (S), mi/h 66.2		66.2	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2293	Average Density (D), pc/mi/ln		18.1	
Level of Service (LOS)		В	Density in Ramp Influence Area (I	Density in Ramp Influence Area (DR), pc/mi/ln 19.2		

	HCS7 Basic Fi	reeway Report			
Project Information					
Analyst	CDM Smith	Date	1/26/2023		
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak		
Project Description	SR 520 on-ramp to Dallas Boulevard 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	3310	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1196		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	73.1		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.4		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freeway	/ Merge Report		
Project Information					
Analyst	CDM Smit	h	Date	1/26/2023	
Agency	CDM Smit	h	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build P	'M Peak
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary
Geometric Data				·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	825	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population		All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	re Weather
Incident Type		No Incident	-		
Final Speed Adjustment Factor (SA	=)		0.980	0.980	
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			3310	260	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			3588	282	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.55	0.14	
Speed and Density					
Upstream Equilibrium Distance (LEG	2), ft	-	Number of Outer Lanes on Free	eway (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 1432		1432
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h 64.3		64.3
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.601	Outer Lanes Freeway Speed (SO), mi/h	70.1
Flow in Lanes 1 and 2 (v12), pc/h		2156	Ramp Junction Speed (S), mi/h		66.3
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2438	Average Density (D), pc/mi/ln		19.5
Level of Service (LOS)		В	Density in Ramp Influence Area	(DR), pc/mi/ln	19.3

HCS7 Basic Freeway Report				
Project Information				
Analyst	CDM Smith	Date	1/26/2023	
Agency	CDM Smith	Analysis Year	2030	
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak	
Project Description	Dallas Boulevard on-ramp to Innovation Way 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	75.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980	
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980	
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000	
Demand and Capacity				
Demand Volume veh/h	3570	Heavy Vehicle Adjustment Factor (fHV)	0.971	
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1290	
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352	
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	72.6	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.8	
Total Ramp Density Adjustment	-	Level of Service (LOS)	В	
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5			

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		HCS7 Freeway	Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date	1/26/2023		
Agency	CDM Smit	h	Analysis Year	2030		
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build P	M Peak	
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary	
Geometric Data				·		
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	270		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population		All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type		No Incident	-			
Final Speed Adjustment Factor (SAI	=)		0.980	0.980		
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			3570	110		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			3870	119		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)			0.55	0.06		
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freev	vay (No)	1	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.320	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1283		1283	
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h 63		63.4	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.658	Outer Lanes Freeway Speed (SO)	, mi/h	79.5	
Flow in Lanes 1 and 2 (v12), pc/h		2587	Ramp Junction Speed (S), mi/h		68.0	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		19.0	
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln	24.1	

	HCS7 Basic Freeway Report					
Project Information						
Analyst	CDM Smith	Date	1/26/2023			
Agency	CDM Smith	Analysis Year	2030			
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak			
Project Description	Downstream of Innovation Way 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	75.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors						
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980			
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980			
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000			
Demand and Capacity						
Demand Volume veh/h	3460	Heavy Vehicle Adjustment Factor (fHV)	0.971			
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1250			
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352			
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.53			
Passenger Car Equivalent (ET)	2.00					
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	72.9			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.1			
Total Ramp Density Adjustment	-	Level of Service (LOS)	В			
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5					

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	HCS7 Basic F	reeway Report			
Project Information					
Analyst	CDM Smith	Date	1/26/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak		
Project Description	Upstream of Innovation Way 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	5080	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _P), pc/h/ln	1836		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	65.5		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	28.0		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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HCS7 Freeway Merge Report					
Project Information					
Analyst	CDM Smitl	า	Date	1/26/2023	
Agency	CDM Smitl	า	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build A	M Peak
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custo	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	908	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors			·		
Driver Population		All Familiar	All Familia	•	
Weather Type		Non-Severe Weather	Non-Sever	e Weather	
Incident Type		No Incident	-		
Final Speed Adjustment Factor (SAI	=)		0.980	0.980	
Final Capacity Adjustment Factor (C	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			5080 170		
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			5507	184	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.81	0.09	
Speed and Density					
Upstream Equilibrium Distance (LEC	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (MS)		0.371
Downstream Equilibrium Distance ((LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 218		2186
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h 61		61.8
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.603	Outer Lanes Freeway Speed (SO),	mi/h	67.4
Flow in Lanes 1 and 2 (v12), pc/h		3321	Ramp Junction Speed (S), mi/h		63.8
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	3505	Average Density (D), pc/mi/ln		29.7
Level of Service (LOS)		С	Density in Ramp Influence Area (I	DR), pc/mi/ln	27.1

HCS7 Basic Freeway Report				
Project Information				
Analyst	CDM Smith	Date	1/26/2023	
Agency	CDM Smith	Analysis Year	2050	
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak	
Project Description	Innovation Way on-ramp to Dallas Boulevard 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	75.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980	
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980	
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000	
Demand and Capacity				
Demand Volume veh/h	5250	Heavy Vehicle Adjustment Factor (fHV)	0.971	
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1897	
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352	
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.81	
Passenger Car Equivalent (ET)	2.00			
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	64.3	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	29.5	
Total Ramp Density Adjustment	-	Level of Service (LOS)	D	
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5			

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		HCS7 Freeway	/ Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date	1/26/2023		
Agency	CDM Smit	h	Analysis Year	2050		
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build A	M Peak	
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration	Length (LA)	ft	1500	825		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			·			
Driver Population		All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type		No Incident	-			
Final Speed Adjustment Factor (SAI	=)		0.980	0.980		
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			5250	5250 390		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			5691	423		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)		0.81	0.21			
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freev	way (No)	1	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.348	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 2118		2118	
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h 62		62.5	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.598	Outer Lanes Freeway Speed (SO)	, mi/h	76.3	
Flow in Lanes 1 and 2 (v12), pc/h		3573	Ramp Junction Speed (S), mi/h		67.0	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		28.3	
Level of Service (LOS)		С	Density in Ramp Influence Area	(DR), pc/mi/ln	27.6	

	HCS7 Basic Fr	eeway Report			
Project Information					
Analyst	CDM Smith	Date	1/26/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak		
Project Description	Dallas Boulevard off-ramp to SR 520 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	4860	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1756		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	67.0		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	26.2		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freeway	Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date	1/26/2023		
Agency	CDM Smit	h	Analysis Year	2050		
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build A	M Peak	
Project Description	Dallas Bou 520 off-rai	levard off-ramp to SR mp	Units	U.S. Custo	mary	
Geometric Data			·	·		
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	240		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population		All Familiar	All Familia	r		
Weather Type		Non-Severe Weather	Non-Sever	e Weather		
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SA	F)		0.980	0.980		
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi)			4860 820			
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			5269	889		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)	Volume-to-Capacity Ratio (v/c)		0.75	0.43		
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freev	vay (No)	1	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.390	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 180		1809	
Distance to Downstream Ramp (LD	OWN), ft	2091	Off-Ramp Influence Area Speed (SR), mi/h		61.2	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.587	Outer Lanes Freeway Speed (SO),	mi/h	77.5	
Flow in Lanes 1 and 2 (v12), pc/h		3460	Ramp Junction Speed (S), mi/h		66.0	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		26.6	
Level of Service (LOS)		D	Density in Ramp Influence Area (DR), pc/mi/ln 31.8		31.8	

	HCS7 Basic F	reeway Report			
Project Information					
Analyst	CDM Smith	Date	1/26/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak		
Project Description	SR 520 off-ramp to 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	4040	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1460		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	71.2		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	20.5		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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Project Information					
Analyst CDM Sm	ith	Date	1/26/2023		
Agency CDM Sm	ith	Analysis Year	2050		
Jurisdiction Orange 0	County	Time Analyzed	No Build A	M Peak	
Project Description Downstr	eam of SR 520 on-ramp	Units	U.S. Custor	mary	
Geometric Data					
		Freeway	Ramp		
Number of Lanes (N), In		3	1		
Free-Flow Speed (FFS), mi/h		75.0	45.0		
Segment Length (L) / Acceleration Length (L	A),ft	1500	390		
Terrain Type		Level	Level		
Percent Grade, %		-	-		
Segment Type / Ramp Type		Freeway	Right-Side	d One-Lane	
Adjustment Factors					
Driver Population		All Familiar	All Familiar	-	
Weather Type		Non-Severe Weather	Non-Sever	Non-Severe Weather	
Incident Type		No Incident	-		
Final Speed Adjustment Factor (SAF)		0.980	0.980		
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)		1.000	1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)		4040	430		
Peak Hour Factor (PHF)		0.95	0.95		
Total Trucks, %		3.00	3.00	3.00	
Single-Unit Trucks (SUT), %		-	-		
Tractor-Trailers (TT), %		-	-		
Heavy Vehicle Adjustment Factor (fHV)		0.971	0.971		
Flow Rate (vi),pc/h		4380	466		
Capacity (c), pc/h		7056	2058		
Volume-to-Capacity Ratio (v/c)		0.69	0.23		
Speed and Density					
Upstream Equilibrium Distance (LEQ), ft	1114.5	Number of Outer Lanes on Freewa	ay (No)	1	
Distance to Upstream Ramp (LUP), ft	2091	Speed Index (Ms)		0.368	
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1805	
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h		61.9	
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.588	Outer Lanes Freeway Speed (SO), r	mi/h	68.8	
Flow in Lanes 1 and 2 (v12), pc/h	2575	Ramp Junction Speed (S), mi/h		64.3	
Flow Entering Ramp-Infl. Area (vR12), pc/h	3041	Average Density (D), pc/mi/ln		25.1	
Level of Service (LOS)	С	Density in Ramp Influence Area (D	R), pc/mi/ln	26.6	

	HCS7 Basic F	reeway Report			
Project Information					
Analyst	CDM Smith	Date	1/26/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak		
Project Description	Downstream of SR 520 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	4470	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1615		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	69.2		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	23.3		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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HCS7 Basic Freeway Report					
Project Information					
Analyst	CDM Smith	Date	1/26/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak		
Project Description	Upstream of SR 520 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	5170	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1868		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	64.9		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	28.8		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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	HCS7 Freeway	Diverge Report			
Project Information					
Analyst CDN	Л Smith	Date	1/26/2023		
Agency CDN	Л Smith	Analysis Year	2050		
Jurisdiction Ora	nge County	Time Analyzed	No Build A	AM Peak	
Project Description Ups	tream of SR 520 off-ramp	Units	U.S. Custo	mary	
Geometric Data			·		
		Freeway	Ramp		
Number of Lanes (N), In		3	1		
Free-Flow Speed (FFS), mi/h		75.0	45.0		
Segment Length (L) / Deceleration Leng	th (LA),ft	1500	230		
Terrain Type		Level	Level		
Percent Grade, %		-	-		
Segment Type / Ramp Type		Freeway	Right-Side	d One-Lane	
Adjustment Factors		<u>'</u>	<u> </u>		
Driver Population		All Familiar	All Familia	r	
Weather Type		Non-Severe Weather	Non-Sever	Non-Severe Weather	
Incident Type		No Incident	-	-	
Final Speed Adjustment Factor (SAF)		0.980	0.980		
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)		1.000	1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)		5170	220		
Peak Hour Factor (PHF)		0.95	0.95		
Total Trucks, %		3.00	3.00	3.00	
Single-Unit Trucks (SUT), %		-	-	-	
Tractor-Trailers (TT), %		-	-	-	
Heavy Vehicle Adjustment Factor (fHV)		0.971	0.971		
Flow Rate (vi),pc/h		5605	238		
Capacity (c), pc/h		7056	2058	2058	
Volume-to-Capacity Ratio (v/c)		0.79	0.12		
Speed and Density					
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freew	ay (No)	1	
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)		0.331	
Downstream Equilibrium Distance (LEQ),	ft -	Flow Outer Lanes (vOA), pc/h/ln		2098	
Distance to Downstream Ramp (LDOWN)	, ft 2091	Off-Ramp Influence Area Speed (SR), mi/h		63.1	
Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.609	Outer Lanes Freeway Speed (So),	mi/h	76.3	
Flow in Lanes 1 and 2 (v12), pc/h	3507	Ramp Junction Speed (S), mi/h		67.5	
Flow Entering Ramp-Infl. Area (vR12), pc,	/h -	Average Density (D), pc/mi/ln		27.7	
Level of Service (LOS)	D			32.3	

	HCS7 Basic Freeway Report					
Project Information						
Analyst	CDM Smith	Date	1/26/2023			
Agency	CDM Smith	Analysis Year	2050			
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak			
Project Description	SR 520 off-ramp to 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	75.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors						
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980			
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980			
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000			
Demand and Capacity						
Demand Volume veh/h	4950	Heavy Vehicle Adjustment Factor (fHV)	0.971			
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1789			
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352			
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.76			
Passenger Car Equivalent (ET)	2.00					
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	66.4			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	26.9			
Total Ramp Density Adjustment	-	Level of Service (LOS)	D			
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5					

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		HCS7 Freeway	/ Merge Report			
Project Information						
Analyst	CDM Smit	า	Date	1/26/2023		
Agency	CDM Smit	า	Analysis Year	2050		
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build A	M Peak	
Project Description	SR 520 on- Boulevard	ramp to Dallas on-ramp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Acceleration	Length (LA),	ft	1500	640		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population		All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SAI	-)		0.980	0.980		
Final Capacity Adjustment Factor (C	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi)			4950	520		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			5366	564		
Capacity (c), pc/h			7056	2058	2058	
Volume-to-Capacity Ratio (v/c)			0.84	0.27		
Speed and Density				·		
Upstream Equilibrium Distance (LEC	ι), ft	1457.5	Number of Outer Lanes on Fre	eway (No)	1	
Distance to Upstream Ramp (LUP),	ft	2091	Speed Index (Ms)		0.432	
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 2173		2173	
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h 5		59.9	
Prop. Freeway Vehicles in Lane 1 ar	id 2 (PFM)	0.595	Outer Lanes Freeway Speed (S	O), mi/h	67.5	
Flow in Lanes 1 and 2 (v12), pc/h		3193	Ramp Junction Speed (S), mi/h	1	62.5	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	3757	Average Density (D), pc/mi/ln		31.6	
Level of Service (LOS)		D	Density in Ramp Influence Are	a (DR), pc/mi/ln	30.6	

HCS7 Basic Freeway Report					
Project Information					
Analyst	CDM Smith	Date	1/26/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak		
Project Description	SR 520 on-ramp to Dallas Boulevard 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity	-				
Demand Volume veh/h	5470	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1977		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	62.5		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	31.6		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freeway	/ Merge Report			
Project Information						
Analyst	CDM Smit	h	Date	1/26/2023		
Agency	CDM Smit	h	Analysis Year	2050		
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build A	M Peak	
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary	
Geometric Data				·		
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Acceleration	Length (LA),	ft	1500	825		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population		All Familiar	All Familia	•		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SA	F)		0.980	0.980		
Final Capacity Adjustment Factor (CAF)			0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			5470 900			
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			5930	976		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)			0.98	0.47		
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Free	way (No)	1	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms)		0.614	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		2366	
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h		54.2	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.601	Outer Lanes Freeway Speed (SO)	, mi/h	66.6	
Flow in Lanes 1 and 2 (v12), pc/h		3564	Ramp Junction Speed (S), mi/h		57.9	
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	4540	Average Density (D), pc/mi/ln		39.8	
Level of Service (LOS)		Е	Density in Ramp Influence Area (DR), pc/mi/ln 35.3		35.3	

	HCS7 Basic Fr	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak
Project Description	Dallas Boulevard on-ramp to Innovation Way 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6370	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2302
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	53.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	42.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	1/26/2023	
Agency	CDM Smit	h	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build A	M Peak
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary
Geometric Data				·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	ft	1500	270	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population		All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			6370 220		
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			6906	238	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.98	0.12	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Free	way (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.331
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		2700
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h		63.1
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.576	Outer Lanes Freeway Speed (SO)), mi/h	74.0
Flow in Lanes 1 and 2 (v12), pc/h		4206	Ramp Junction Speed (S), mi/h		67.0
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		34.4
Level of Service (LOS)		Е	Density in Ramp Influence Area (DR), pc/mi/ln 38.0		38.0

	HCS7 Basic Fr	eeway Report			
Project Information					
Analyst	CDM Smith	Date	1/26/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	No Build AM Peak		
Project Description	Downstream of Innovation Way 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	6150	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	2222		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	56.2		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	39.5		
Total Ramp Density Adjustment	-	Level of Service (LOS)	Е		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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	HCS7 Basic Freeway Report				
Project Information					
Analyst	CDM Smith	Date	1/26/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak		
Project Description	Upstream of Innovation Way 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	6070	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2193		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.93		
Passenger Car Equivalent (ET)	2.00				
Speed and Density	-				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	57.0		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	38.5		
Total Ramp Density Adjustment	-	Level of Service (LOS)	E		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freewa	y Merge Report		
Project Information					
Analyst	CDM Smit	า	Date	1/26/2023	
Agency	CDM Smit	า	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build P	M Peak
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custo	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	908	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors				-	
Driver Population		All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type	Incident Type		No Incident	-	
Final Speed Adjustment Factor (SA	=)		0.980	0.980	
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			6070	6070 220	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			6580	238	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.97	0.12	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (MS)		0.503
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 2612		2612
Distance to Downstream Ramp (LD	Distance to Downstream Ramp (LDOWN), ft -		On-Ramp Influence Area Speed (SR), mi/h	57.7
Prop. Freeway Vehicles in Lane 1 ar	p. Freeway Vehicles in Lane 1 and 2 (PFM) 0.603		Outer Lanes Freeway Speed (SO),	Outer Lanes Freeway Speed (SO), mi/h	
Flow in Lanes 1 and 2 (v12), pc/h		3968	Ramp Junction Speed (S), mi/h		60.3
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	4206	Average Density (D), pc/mi/ln		37.7
Level of Service (LOS)		D	Density in Ramp Influence Area (I	DR), pc/mi/ln	32.6

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	Innovation Way on-ramp to Dallas Boulevard 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6290	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	2273
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.97
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	54.7
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	41.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	/ Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date	1/26/2023		
Agency	CDM Smit	h	Analysis Year	2050		
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build P	M Peak	
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custo	mary	
Geometric Data				·		
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration	Length (LA)	ft	1500	825		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors			·			
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	Non-Severe Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SA	F)		0.980	0.980		
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			6290	820		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00		
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			6819	889		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)			0.97	0.43		
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.390	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 26		2674	
Distance to Downstream Ramp (LDOWN), ft -		Off-Ramp Influence Area Speed (SR), mi/h	61.2		
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.549	Outer Lanes Freeway Speed (SO),	Outer Lanes Freeway Speed (SO), mi/h		
Flow in Lanes 1 and 2 (v12), pc/h		4145	Ramp Junction Speed (S), mi/h		65.7	
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		34.6	
Level of Service (LOS)		D	Density in Ramp Influence Area (I	OR), pc/mi/ln	32.5	

	HCS7 Basic Fr	eeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	Dallas Boulevard off-ramp to SR 520 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5470	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1977
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	62.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	31.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	1/26/2023	
Agency	CDM Smit	h	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build P	M Peak
Project Description	Dallas Bou 520 off-rai	levard off-ramp to SR mp	Units	U.S. Custon	mary
Geometric Data				·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	240	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population	Driver Population			All Familia	r
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			5470	820	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			5930	889	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.84	0.43	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft - Speed Index (DS)		Speed Index (Ds)		0.390
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		2163
Distance to Downstream Ramp (LDOWN), ft 2091		Off-Ramp Influence Area Speed (SR), mi/h	61.2	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.571	Outer Lanes Freeway Speed (SO),	mi/h	76.1
Flow in Lanes 1 and 2 (v12), pc/h		3767	Ramp Junction Speed (S), mi/h		65.9
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		30.0
Level of Service (LOS)		D	Density in Ramp Influence Area (DR), pc/mi/ln	34.5

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	SR 520 off-ramp to 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4650	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1680
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.71
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	68.3
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	24.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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Project Information Nayst CDM Smit			HCS7 Freeway	Merge Report				
Agency CDM Smith Analysis Year 2050 Jurisdiction Orange Courty Time Analyzed No Build PM Peak Project Description Downstream Inits U.S. Customy Freeway Bamp ————————————————————————————————————	Project Information							
Aurisdiction Orange County Time Analyzed No Build PM Peak Project Description Downstree of SR 520 on-ramp Units US. Customary Geometric Data Freeway Ramp Freeway Speed (FFS), mi/h 3 1 Free-Flow Speed (FFS), mi/h 75.0 45.0 Segment Length (L) / Acceleration—Instity (LAI,ft 1500 390 Freered Grade, % 1500 390 Freeded Grade, % Revel Level Percent Grade, % Rept Separation Rept Separation Adjustment Factor Separation All Familiar All Familiar Meanter Type Non-Severe Weather Non-Severe Weather Inclient Type	Analyst	CDM Smitl	า	Date	1/26/2023	}		
Project Description Developed (PFS), mi/n	Agency	CDM Smitl	1	Analysis Year	2050			
Prevent	Jurisdiction	Orange Co	unty	Time Analyzed	No Build F	PM Peak		
Number of Lanes (N), In 3 1 1 1 1 1 1 1 1 1	Project Description	Downstrea	m of SR 520 on-ramp	Units	U.S. Custo	mary		
Number of Lanes (N), In 3 1 Free-Flow Speed (FFS), mi/h 75.0 45.0 Segment Length (L) / Acceleration Length (LA), It 1500 390 Terrain Type Level Level Percent Grade, % - - Segment Type / Ramp Type freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type Non-Severe Weather Non-Severe Weather Non-Severe Weather Non-Severe Weather Non-Severe Wea	Geometric Data							
Free-Flow Speed (FFS), ml/h 75.0 45.0 Segment Length (L) / Acceleration Length (LA). ★ 1500 390 Freeran Grade, % Level Level Percent Grade, % Freeway Right-3cd Colspan="2">Segment Type / Ramp Type Freeway Right-3cd Colspan="2">Segment Type / Ramp Type All Familiar				Freeway	Ramp			
Segment Length (L) / Acceleration Length (LA) ± 1500 390 □ Terrain Type Level Level □	Number of Lanes (N), In			3	1			
Terrain Type Level Level Percent Grade, % - - Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type Non Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (CAF) 0.980 0.990 Demand Adjustment Factor (CAF) 0.990 0.990 Demand Adjustment Factor (FAF) 4650 220 Demand Adjustment Factor (PHF) 0.95 0.95 Demand Volume (V) 4650 2.95 Demand Volume (V) 4650 2.95 Demand Volume (V) 4650 2.95 Demand Volume (V) 9.95 0.95<	Free-Flow Speed (FFS), mi/h			75.0	45.0			
Percent Grade, % -	Segment Length (L) / Acceleration I	_ength (LA),	ft	1500	390			
Segment Type / Ramp Type Refeway Right Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident	Terrain Type			Level	Level			
Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand and Capacity Demand and Capacity Demand Sepacity Demand Capacity	Percent Grade, %			-	-			
Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Adjustment Factor (DAF) 4650 220 Demand Volume (Vi) 4650 220 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fitv) 0.971 0.971 Flow Rate (vi),pc/h 5041 238 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 7056 2058 Volume-to-Capacity Ratio (v/c) 1 0.7 Speed and Density Upstream Equilibrium Distance (LEQ), ft 2072	Segment Type / Ramp Type			Freeway	Right-Side	ed One-Lane		
Weather Type Non-Severe Weather Non-Severe Weather Non-Severe Weather Incident Type No Incident -	Adjustment Factors							
Incident Type No Incident	Driver Population			All Familiar	All Familia	r		
Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Adjustment Factor (PAF) 4650 220 Demand Volume (Vi) 4650 220 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi), pc/h 5041 238 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.75 0.12 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1207.2 Number of Outer Lanes on Freeway (No) 1 Distance to Upstream Ramp (LuP), ft 2091 Speed Index (Ms) 0.382	Weather Type			Non-Severe Weather	Non-Seve	Non-Severe Weather		
Final Capacity Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand and Capacity Demand Volume (Vi) 4650 220 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi), pc/h 5041 238 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.75 0.12 Speed and Density Upstream Equilibrium Distance (LEQ), ft 2091 Number of Outer Lanes on Freeway (NO) 1 Speed Index (Ms) 0.382 Downstream Ramp (LUP), ft 2091 Speed Index (Ms) 0.382 Ownstream Ramp (LIP), ft 2091 Speed Index (Ms) 0.382 Downstream Ramp (LDOwn), ft - Flow Outer Lanes (voo), pc/h/ln 61.5 <td>Incident Type</td> <td></td> <td></td> <td>No Incident</td> <td>-</td> <td colspan="2">-</td>	Incident Type			No Incident	-	-		
Demand Adjustment Factor (DAF) 1,000 1,000 Demand and Capacity Demand Volume (Vi) 4650 220 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi),pc/h 5041 238 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (w/c) 0.75 0.12 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1207.2 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2091 Speed Index (Ms) 0.382 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (voA), pc/h/ln 61.5 Distance to Downstream Ramp (LDOWN), ft - Flow Outer Lanes Freeway Speed (So), mi/h 61.5 <td <="" colspan="2" td=""><td>Final Speed Adjustment Factor (SAF</td><td>=)</td><td></td><td>0.980</td><td>0.980</td><td></td></td>	<td>Final Speed Adjustment Factor (SAF</td> <td>=)</td> <td></td> <td>0.980</td> <td>0.980</td> <td></td>		Final Speed Adjustment Factor (SAF	=)		0.980	0.980	
Demand and Capacity Demand Volume (Vi) 4650 220 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi),pc/h 5041 238 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.75 0.12 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1207.2 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2091 Speed Index (Ms) 0.382 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (voA), pc/h/In 2077 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (S), mi/h 61.5 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.8 Flow in Lanes 1 and 2 (v12), pc/h 2964 Ramp Junction Speed (S), mi/h	Final Capacity Adjustment Factor (CAF)		0.980	0.980				
Demand Volume (Vi) 4650 220 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi),pc/h 5041 238 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.75 0.12 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1207.2 Number of Outer Lanes on Freeway (No) 1 Distance to Upstream Ramp (LUP), ft 2091 Speed Index (Ms) 0.382 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 2077 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (S), mi/h 61.5 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (S), mi/h 67.8 Flow in Lanes 1 and 2 (v12), pc/h 2964 Ramp Junction Speed (S), mi/h 63.8	Demand Adjustment Factor (DAF)			1.000	1.000			
Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi),pc/h 5041 238 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.75 0.12 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1207.2 Number of Outer Lanes on Freeway (No) 1 Distance to Upstream Ramp (LUP), ft 2091 Speed Index (Ms) 0.382 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (voA), pc/h/ln 2077 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (S), mi/h 61.5 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.8 Flow in Lanes 1 and 2 (v12), pc/h 2964 Ramp Junction Speed (S), mi/h 63.8	Demand and Capacity				·			
Total Trucks, % 3.00 3.00 3.00 Single-Unit Trucks (SUT), %	Demand Volume (Vi)			4650	220			
Single-Unit Trucks (SUT), % - <td>Peak Hour Factor (PHF)</td> <td></td> <td></td> <td>0.95</td> <td>0.95</td> <td></td>	Peak Hour Factor (PHF)			0.95	0.95			
Tractor-Trailers (TT), %	Total Trucks, %			3.00	3.00	3.00		
Heavy Vehicle Adjustment Factor (fHv) Flow Rate (vi),pc/h Capacity (c), pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Ramp (LUP), ft Distance to Downstream Ramp (LDOWN), ft Distance to Downstream Ramp (LDOWN), ft Prop. Freeway Vehicles in Lane 1 and 2 (PFM) Flow in Lanes 1 and 2 (v12), pc/h Downstream Equilibrium Distance (LEQ), ft Prop. Freeway Vehicles in Lane 1 and 2 (PFM) Prop. Freeway Vehicles in Lane 1 and 2 (V12), pc/h Prop. Freeway Vehicles in Lane 2 (9FM) Downstream Equilibrium Distance (LEQ), ft Prop. Freeway Vehicles in Lane 1 and 2 (PFM) Prop. Freeway Vehicles in Lane 1 and 2 (V12), pc/h Prop. Freeway Vehicles in Lane 1 and 2 (V12), pc/h Prop. Freeway Vehicles in Lane 2 (9FM) Prop. Freeway Vehicles in Lane 1 and 2 (V12), pc/h Prop. Freeway Vehicles in Lane 1 and 2 (V12	Single-Unit Trucks (SUT), %			-	-	-		
Flow Rate (vi),pc/h Capacity (c), pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Ramp (LUP), ft Downstream Equilibrium Distance (LEQ), ft Distance to Downstream Ramp (LDOWN), ft Distance to Downstream Ramp (LDOWN), ft Prop. Freeway Vehicles in Lane 1 and 2 (PFM) Flow in Lanes 1 and 2 (v12), pc/h South 1207.2 Number of Outer Lanes on Freeway (NO) Speed Index (Ms) Flow Outer Lanes (vOA), pc/h/In On-Ramp Influence Area Speed (SR), mi/h 61.5 Conter Lanes 1 and 2 (v12), pc/h Ramp Junction Speed (S), mi/h 63.8	Tractor-Trailers (TT), %			-	-	-		
Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft 1207.2 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2091 Speed Index (MS) 0.382 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 2077 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.5 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.8 Flow in Lanes 1 and 2 (v12), pc/h 2964 Ramp Junction Speed (S), mi/h 63.8	Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	0.971		
Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft 1207.2 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2091 Speed Index (MS) 0.382 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (voA), pc/h/ln 2077 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.5 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.8 Flow in Lanes 1 and 2 (v12), pc/h 2964 Ramp Junction Speed (S), mi/h 63.8	Flow Rate (vi),pc/h			5041	238	238		
Speed and DensityUpstream Equilibrium Distance (LEQ), ft1207.2Number of Outer Lanes on Freeway (No)1Distance to Upstream Ramp (LUP), ft2091Speed Index (Ms)0.382Downstream Equilibrium Distance (LEQ), ft-Flow Outer Lanes (voA), pc/h/ln2077Distance to Downstream Ramp (LDOWN), ft-On-Ramp Influence Area Speed (SR), mi/h61.5Prop. Freeway Vehicles in Lane 1 and 2 (PFM)0.588Outer Lanes Freeway Speed (SO), mi/h67.8Flow in Lanes 1 and 2 (v12), pc/h2964Ramp Junction Speed (S), mi/h63.8	Capacity (c), pc/h			7056	2058	2058		
Upstream Equilibrium Distance (LEQ), ft 1207.2 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2091 Speed Index (Ms) 0.382 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 2077 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.5 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.8 Flow in Lanes 1 and 2 (v12), pc/h 2964 Ramp Junction Speed (S), mi/h 63.8	Volume-to-Capacity Ratio (v/c)			0.75	0.12			
Distance to Upstream Ramp (LUP), ft 2091 Speed Index (Ms) 0.382 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 2077 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.5 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.8 Flow in Lanes 1 and 2 (v12), pc/h 2964 Ramp Junction Speed (S), mi/h 63.8	Speed and Density							
Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 2077 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.5 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.8 Flow in Lanes 1 and 2 (v12), pc/h 2964 Ramp Junction Speed (S), mi/h 63.8	Upstream Equilibrium Distance (LEC)), ft	1207.2	Number of Outer Lanes or	n Freeway (NO)	1		
Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.5 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.8 Flow in Lanes 1 and 2 (v12), pc/h 2964 Ramp Junction Speed (S), mi/h 63.8	Distance to Upstream Ramp (LUP), f	t	2091	Speed Index (Ms)		0.382		
Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.8 Flow in Lanes 1 and 2 (v12), pc/h 2964 Ramp Junction Speed (S), mi/h 63.8	Downstream Equilibrium Distance (1 Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln		c/h/ln	2077			
Flow in Lanes 1 and 2 (v12), pc/h 2964 Ramp Junction Speed (S), mi/h 63.8	Distance to Downstream Ramp (LDC	stance to Downstream Ramp (LDOWN), ft		On-Ramp Influence Area S	Speed (SR), mi/h	61.5		
	Prop. Freeway Vehicles in Lane 1 an	d 2 (PFM)	0.588	Outer Lanes Freeway Speed (SO), mi/h 6		67.8		
Flow Entering Ramp-Infl. Area (vR12), pc/h 3202 Average Density (D), pc/mi/ln 27.6	Flow in Lanes 1 and 2 (v12), pc/h		2964	· ·		63.8		
<u> </u>	Flow Entering Ramp-Infl. Area (vR12), pc/h	3202	Average Density (D), pc/m	ni/ln	27.6		
Level of Service (LOS) C Density in Ramp Influence Area (DR), pc/mi/ln 28.0	Level of Service (LOS)		С	Density in Ramp Influence	Area (DR), pc/mi/ln	28.0		

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	Downstream of SR 520 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4870	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1760
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	66.9
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	73.5		

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	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	Upstream of SR 520 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4770	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1724
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	67.6
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	25.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

HCSTM Freeways Version 7.9.6 2050 PM WB_1.xuf

		HCS7 Freeway	Diverge Report			
Project Information						
Analyst	CDM Smith	า	Date	1/26/2023		
Agency	CDM Smith	1	Analysis Year	2050		
Jurisdiction	Orange Co	unty	Time Analyzed	No Build P	M Peak	
Project Description	Upstream (of SR 520 off-ramp	Units	U.S. Custo	mary	
Geometric Data				•		
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration L	ength (LA),	ft	1500	230		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familiar		
Weather Type			Non-Severe Weather	Non-Sever	Non-Severe Weather	
Incident Type			No Incident	-	-	
Final Speed Adjustment Factor (SAF)			0.980	0.980		
Final Capacity Adjustment Factor (CAF)		0.980	0.980			
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			4770	430		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00		
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-	-	
Heavy Vehicle Adjustment Factor (fH	V)		0.971	0.971	0.971	
Flow Rate (vi),pc/h			5171	466		
Capacity (c), pc/h			7056	2058	2058	
Volume-to-Capacity Ratio (v/c)			0.73	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)		0.352	
Downstream Equilibrium Distance (L	EQ), ft	- Flow Outer Lanes (vOA), pc/h/ln		1840		
Distance to Downstream Ramp (LDO	wn), ft	2091	Off-Ramp Influence Area Speed (SR), mi/h		62.4	
Prop. Freeway Vehicles in Lane 1 and	d 2 (PFD)	0.609	Outer Lanes Freeway Speed (SO), mi/h 77.		77.4	
Flow in Lanes 1 and 2 (v12), pc/h		3331	Ramp Junction Speed (S), m	ni/h	67.0	
Flow Entering Ramp-Infl. Area (vR12)	, pc/h	-	Average Density (D), pc/mi/	/In	25.7	
Level of Service (LOS)		D	Density in Ramp Influence A	Area (DR), pc/mi/ln	30.8	

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	SR 520 off-ramp to 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4340	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1568
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	69.9
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	/ Merge Report			
Project Information						
Analyst	CDM Smitl	า	Date	1/26/2023		
Agency	CDM Smitl	า	Analysis Year	2050		
Jurisdiction	Orange Co	unty	Time Analyzed	No Build P	M Peak	
Project Description	SR 520 on- Boulevard	ramp to Dallas on-ramp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Acceleration I	Length (LA),	ft	1500	640		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	Non-Severe Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SAF	-)		0.980	0.980		
Final Capacity Adjustment Factor (C	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			4340 520			
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00		
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			4705	564		
Capacity (c), pc/h			7056	2058	2058	
Volume-to-Capacity Ratio (v/c)			0.75	0.27		
Speed and Density						
Upstream Equilibrium Distance (LEC	ι), ft	1316.0	Number of Outer Lanes on Free	way (No)	1	
Distance to Upstream Ramp (LUP), f	ft	2091	Speed Index (Ms)		0.377	
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1906		1906	
Distance to Downstream Ramp (LDOWN), ft -		-	On-Ramp Influence Area Speed	(SR), mi/h	61.6	
Prop. Freeway Vehicles in Lane 1 an	nd 2 (PFM)	0.595	Outer Lanes Freeway Speed (SO), mi/h		68.4	
Flow in Lanes 1 and 2 (v12), pc/h		2799	Ramp Junction Speed (S), mi/h		63.9	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	3363	Average Density (D), pc/mi/ln		27.5	
Level of Service (LOS)		С	Density in Ramp Influence Area	(DR), pc/mi/ln	27.5	

	HCS7 Basic Fi	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	SR 520 on-ramp to Dallas Boulevard 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4860	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1756
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	67.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	26.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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HCS7 Freeway Merge Report					
Project Information					
Analyst	CDM Smit	h	Date	1/26/2023	
Agency	CDM Smit	h	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build P	M Peak
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	825	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familiar	
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			4860 390		
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			5269	423	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.81	0.21	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms)		0.390
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 2102		2102
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h 61.2		61.2
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.601	Outer Lanes Freeway Speed (SO),	mi/h	67.7
Flow in Lanes 1 and 2 (v12), pc/h		3167	Ramp Junction Speed (S), mi/h		63.4
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	3590	Average Density (D), pc/mi/ln		29.9
Level of Service (LOS)		D	Density in Ramp Influence Area (DR), pc/mi/ln 28.2		

	HCS7 Basic Fi	reeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	Dallas Boulevard on-ramp to Innovation Way 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity	-		
Demand Volume veh/h	5250	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1897
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.81
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	64.3
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	29.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	1/26/2023	
Agency	CDM Smit	h	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	No Build P	M Peak
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custon	mary
Geometric Data				•	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	270	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familiar	
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			5250	170	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			5691	184	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.81	0.09	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.326
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 2153		2153
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h 63.2		63.2
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.609	Outer Lanes Freeway Speed (SO),	mi/h	76.1
Flow in Lanes 1 and 2 (v12), pc/h		3538	Ramp Junction Speed (S), mi/h		67.5
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		28.1
Level of Service (LOS)		D	Density in Ramp Influence Area (DR), pc/mi/ln 32.2		

	HCS7 Basic Fr	eeway Report	
Project Information			
Analyst	CDM Smith	Date	1/26/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	No Build PM Peak
Project Description	Downstream of Innovation Way 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			-
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5080	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1836
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	65.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	28.0
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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HCS7 Basic Freeway Report					
Project Information					
CDM Smith	Date	2/8/2023			
CDM Smith	Analysis Year	2030			
Orange County	Time Analyzed	Build AM Peak			
Upstream of Innovation Way on-ramp	Units	U.S. Customary			
3	Terrain Type	Level			
-	Percent Grade, %	-			
Measured	Grade Length, mi	-			
-	Total Ramp Density (TRD), ramps/mi	-			
-	Free-Flow Speed (FFS), mi/h	75.0			
-					
Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980			
Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980			
No Incident	Demand Adjustment Factor (DAF)	1.000			
3460	Heavy Vehicle Adjustment Factor (fHV)	0.971			
0.95	Flow Rate (V _p), pc/h/ln	1250			
3.00	Capacity (c), pc/h/ln	2400			
-	Adjusted Capacity (cadj), pc/h/ln	2352			
-	Volume-to-Capacity Ratio (v/c)	0.53			
2.00					
Speed and Density					
-	Average Speed (S), mi/h	72.9			
-	Density (D), pc/mi/ln	17.1			
-	Level of Service (LOS)	В			
73.5					
	CDM Smith CDM Smith Orange County Upstream of Innovation Way on-ramp 3 - Measured Mostly Familiar Non-Severe Weather No Incident 3460 0.95 3.00 2.00	CDM Smith Date CDM Smith Analysis Year Orange County Time Analyzed Upstream of Innovation Way on-ramp 3 Terrain Type - Percent Grade, % Measured Grade Length, mi - Total Ramp Density (TRD), ramps/mi - Free-Flow Speed (FFS), mi/h - Free-Flow Speed Adjustment Factor (SAF) Non-Severe Weather Final Capacity Adjustment Factor (CAF) No Incident Demand Adjustment Factor (DAF) 3460 Heavy Vehicle Adjustment Factor (fHv) 0.95 Flow Rate (Vp), pc/h/ln 3.00 Capacity (c), pc/h/ln - Adjusted Capacity (cadj), pc/h/ln - Volume-to-Capacity Ratio (v/c) 2.00 - Average Speed (S), mi/h - Density (D), pc/mi/ln - Level of Service (LOS)			

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HCS7 Freeway Merge Report					
Project Information					
Analyst	CDM Smit	h	Date	2/8/2023	
Agency	CDM Smit	h	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build AM F	Peak
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custo	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	908	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	•
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			3460	110	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			3751	119	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.55	0.06	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms)		0.283
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1489		1489
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (On-Ramp Influence Area Speed (SR), mi/h 64.6	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.603	Outer Lanes Freeway Speed (SO),	mi/h	69.9
Flow in Lanes 1 and 2 (v12), pc/h		2262	Ramp Junction Speed (S), mi/h	Ramp Junction Speed (S), mi/h 66.5	
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	2381	Average Density (D), pc/mi/ln		19.4
Level of Service (LOS)		В	Density in Ramp Influence Area (DR), pc/mi/ln 18.4		

	HCS7 Basic Fi	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/8/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	Build AM Peak
Project Description	Innovation Way on-ramp to Dallas Boulevard 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3570	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1290
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.55
Passenger Car Equivalent (ET)	2.00		
Speed and Density			-
Lane Width Adjustment (fLW)	ļ-	Average Speed (S), mi/h	72.6
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	/ Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	2/8/2023	
Agency	CDM Smit	h	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build AM F	Peak
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custo	mary
Geometric Data	•			·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	825	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	r
Weather Type			Non-Severe Weather	Non-Sever	re Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (Final Capacity Adjustment Factor (CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			3570	3570 260	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	·HV)		0.971	0.971	
Flow Rate (vi),pc/h			3870	282	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.55	0.14	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freev	vay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.335
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1256		1256
Distance to Downstream Ramp (LD	OWN), ft	2519	Off-Ramp Influence Area Speed	(SR), mi/h	62.9
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.650	Outer Lanes Freeway Speed (SO),	mi/h	79.6
Flow in Lanes 1 and 2 (v12), pc/h		2614	Ramp Junction Speed (S), mi/h		67.5
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		19.1
Level of Service (LOS)		В	Density in Ramp Influence Area (DR), pc/mi/ln 19.3		

	HCS7 Basic Fr	eeway Report	
Project Information			
Analyst	CDM Smith	Date	2/13/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	Build AM Peak
Project Description	Dallas Boulevard off-ramp to 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity	-		-
Demand Volume veh/h	3310	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1196
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	73.1
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Merge Report			
Project Information						
Analyst	CDM Smith	า	Date		2/13/2023	
Agency	CDM Smith	1	Analysis Year		2030	
Jurisdiction	Orange Co	unty	Time Analyzed		Build AM P	eak eak
	Dallas Bou 520 off-rar	levard on-ramp to SR np	Units		U.S. Custor	mary
Geometric Data						
			Freeway		Ramp	
Number of Lanes (N), In			3		1	
Free-Flow Speed (FFS), mi/h			75.0		45.0	
Segment Length (L) / Acceleration L	ength (LA),	ft	1500		390	
Terrain Type			Level		Level	
Percent Grade, %			-		-	
Segment Type / Ramp Type			Freeway		Right-Side	d One-Lane
Adjustment Factors						
Driver Population			All Familiar		All Familiar	
Weather Type			Non-Severe Weather		Non-Severe Weather	
Incident Type			No Incident		-	
Final Speed Adjustment Factor (SAF))		0.980		0.980	
Final Capacity Adjustment Factor (Ca	AF)		0.980		0.980	
Demand Adjustment Factor (DAF)			1.000		1.000	
Demand and Capacity						
Demand Volume (Vi)			3310 160			
Peak Hour Factor (PHF)			0.95		0.95	
Total Trucks, %			3.00		3.00	
Single-Unit Trucks (SUT), %			-		-	
Tractor-Trailers (TT), %			-		-	
Heavy Vehicle Adjustment Factor (f	·IV)		0.971		0.971	
Flow Rate (vi),pc/h			3588		173	
Capacity (c), pc/h			7056		2058	
Volume-to-Capacity Ratio (v/c)			0.53		0.08	
Speed and Density						
Upstream Equilibrium Distance (LEQ), ft	882.3	Number of Outer Lanes o	n Freeway	/ (No)	1
Distance to Upstream Ramp (LUP), ft	t	2519	Speed Index (MS)			0.325
Downstream Equilibrium Distance (L	_EQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1478		1478	
Distance to Downstream Ramp (LDC	WN), ft	-	On-Ramp Influence Area Speed (SR), mi/h 63.3		63.3	
Prop. Freeway Vehicles in Lane 1 and	d 2 (PFM)	0.588	Outer Lanes Freeway Speed (SO), mi/h 70.0		70.0	
Flow in Lanes 1 and 2 (v12), pc/h		2110	Ramp Junction Speed (S),	mi/h		65.8
Flow Entering Ramp-Infl. Area (vR12)), pc/h	2283	Average Density (D), pc/n	ni/ln		19.1
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 20.8			20.8

HCS7 Basic Freeway Report						
Project Information						
Analyst	CDM Smith	Date	2/13/2023			
Agency	CDM Smith	Analysis Year	2030			
Jurisdiction	Orange County	Time Analyzed	Build AM Peak			
Project Description	Dallas Boulevard on-ramp to SR 520 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	75.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors						
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980			
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980			
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000			
Demand and Capacity	-					
Demand Volume veh/h	3470	Heavy Vehicle Adjustment Factor (fHV)	0.971			
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1254			
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352			
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.53			
Passenger Car Equivalent (ET)	2.00					
Speed and Density						
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	72.8			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.2			
Total Ramp Density Adjustment	-	Level of Service (LOS)	В			
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5					

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		HCS7 Freeway	Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	2/13/2023	
Agency	CDM Smit	h	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build AM F	Peak
Project Description	Dallas Bou 520 off-rai	llevard on-ramp to SR mp	Units	U.S. Custo	mary
Geometric Data			·	·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	240	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	r
Weather Type		Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SAI	=)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)			0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			3470	70 560	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			3762	607	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.53	0.29	
Speed and Density					
Upstream Equilibrium Distance (LEC	Ω), ft	-	Number of Outer Lanes on Freew	/ay (NO)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (DS)		0.364
Downstream Equilibrium Distance ((LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1142
Distance to Downstream Ramp (LD	OWN), ft	2091	Off-Ramp Influence Area Speed (SR), mi/h	62.0
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.638	Outer Lanes Freeway Speed (SO),	mi/h	80.1
Flow in Lanes 1 and 2 (v12), pc/h		2620	Ramp Junction Speed (S), mi/h		66.6
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		18.8
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln	24.6

	HCS7 Basic F	reeway Report			
Project Information					
Analyst	CDM Smith	Date	2/13/2023		
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	SR 520 off-ramp to 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors	-				
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	2910	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1052		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.45		
Passenger Car Equivalent (ET)	2.00				
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	73.5		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	14.3		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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Project Information Analyst CDM Smith Date Agency CDM Smith Analysis M Jurisdiction Orange County Time Anal Project Description Downstream of SR 520 on-ramp Units Geometric Data Freeway Number of Lanes (N), In 3 Free-Flow Speed (FFS), mi/h 75.0 Segment Length (L) / Acceleration Length (LA),ft 1500 Terrain Type Level Percent Grade, % - Segment Type / Ramp Type Freeway Adjustment Factors Driver Population All Familia Weather Type Non-Sevel Incident Type No Incident Final Speed Adjustment Factor (SAF) 0.980 Final Capacity Adjustment Factor (CAF) 0.980 Demand And Capacity Demand Volume (Vi) 2910 Peak Hour Factor (PHF) 0.95 Total Trucks, % 3.00 Single-Unit Trucks (SUT), % - Tractor-Trailers (TT), % - Heavy Vehicle Adjustment Factor (fHV) 1.956 Volume-to-Capacity Ratio (v/c) 0.48	r re Weather	2/13/2023 2030 Build AM Per U.S. Custom Ramp 1 45.0 390 Level - Right-Sided All Familiar Non-Severe	d One-Lane	
Agency CDM Smith Analysis Your Jurisdiction Orange County Time Anal Project Description Downstream of SR 520 on-ramp Units Geometric Data Freeway Number of Lanes (N), In 3 Free-Flow Speed (FFS), mi/h 75.0 Segment Length (L) / Acceleration Length (LA),ft 1500 Terrain Type Level Percent Grade, % - Segment Type / Ramp Type Freeway Adjustment Factors Driver Population All Familia Weather Type Non-Sevel Incident Type Non-Sevel Incident Type No Incident Final Speed Adjustment Factor (SAF) 0.980 Final Capacity Adjustment Factor (CAF) 0.980 Demand Adjustment Factor (DAF) 1.000 Demand And Capacity Demand Volume (Vi) 2910 Peak Hour Factor (PHF) 0.95 Total Trucks, % 3.00 Single-Unit Trucks (SUT), % - Tractor-Trailers (TT), % - Heavy Vehicle Adjustment Factor (fHv) 1.956 Capacity (c), pc/h 7056	r re Weather	2030 Build AM Per U.S. Custom Ramp 1 45.0 390 Level - Right-Sided	d One-Lane	
Jurisdiction Orange County Time Anal Project Description Downstream of SR 520 on-ramp Units Geometric Data Freeway Number of Lanes (N), In Free-Flow Speed (FFS), mi/h Segment Length (L) / Acceleration Length (LA),ft Terrain Type Level Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Meather Type Incident Type Non-Sevel Incident Type No Incident Final Speed Adjustment Factor (SAF) Final Speed Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand And Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Capacity (c), pc/h To50 Trocks To50 Trucks (SUT), pc/h To56	r re Weather	Ramp 1 45.0 390 Level - Right-Sided	d One-Lane	
Project Description Downstream of SR 520 on-ramp Units Geometric Data Freeway Number of Lanes (N), In Free-Flow Speed (FFS), mi/h Segment Length (L) / Acceleration Length (LA),ft Terrain Type Level Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Meather Type Incident Type Non-Sevel Incident Type No Incident Final Speed Adjustment Factor (SAF) Demand Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand Adjustment Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Capacity (c), pc/h To50 Tractor Total Trucks (SUT), pc/h Capacity (c), pc/h To50 Tos0 Tree-Flow Speed (FFS), mi/h Trucks (SUT), pc/h Tos0 Tree-Flow Speed (FFS), mi/h Trucks (SUT), pc/h Tos0 Tree-Flow Speed (FFS), mi/h Tractor-Trailers (TT), %	r re Weather	Ramp 1 45.0 390 Level - Right-Sided	d One-Lane	
Freeway Number of Lanes (N), In 3 3 5 5 5 5 5 5 5 5	re Weather	Ramp 1 45.0 390 Level - Right-Sided	d One-Lane	
Number of Lanes (N), In Free-Flow Speed (FFS), mi/h Free-Flow Speed (FFS), mi/h Free-Flow Speed (FFS), mi/h Free-Flow Speed (FFS), mi/h Ferrain Type Level Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population All Familia Weather Type Non-Sevel Incident Type No Incident Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand And Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h To50 To50 Terrain Type I 500 To50	re Weather	1 45.0 390 Level - Right-Sided		
Number of Lanes (N), In Free-Flow Speed (FFS), mi/h Segment Length (L) / Acceleration Length (LA),ft Terrain Type Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Non-Sevel Incident Type No Incider Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand Adjustment Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h To50 Total Trucks (SUT), 7056	re Weather	1 45.0 390 Level - Right-Sided		
Free-Flow Speed (FFS), mi/h Segment Length (L) / Acceleration Length (LA),ft Terrain Type Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Incident Type Incident Type Incident Grade, W Segment Type Non-Sevel Incident Type Incident Typ	re Weather	45.0 390 Level - Right-Sided		
Segment Length (L) / Acceleration Length (LA),ft Terrain Type Level Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Incident Type Incident Type No Incider Final Speed Adjustment Factor (SAF) Demand Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Total Trucks (CAF) Demand Response of the properties of the pr	re Weather	390 Level - Right-Sided		
Terrain Type Level Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type No Incident Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand And Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHv) Flow Rate (vi),pc/h Capacity (c), pc/h Freeway All Familia All Familia Preeway Non-Sevel No Incident Non-Sevel No Incident 1.000 980 998	re Weather	Level - Right-Sided All Familiar		
Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population All Familia Weather Type Non-Sevel Incident Type No Incident Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand And Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % 3.00 Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h 7056	re Weather	- Right-Sided		
Segment Type / Ramp Type Adjustment Factors Driver Population Meather Type Incident Type Incident Type No Incident Final Speed Adjustment Factor (SAF) Demand Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand And Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % 3.00 Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h All Familia All Familia Freeway Preeway All Familia All Familia All Familia All Familia All Familia Demandia All Familia Non-Sevet No Incident 1.000 Desable 1.000	re Weather	All Familiar		
Adjustment Factors Driver Population All Familia Weather Type Incident Type No Incident Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand And Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % 3.00 Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h All Familia All Familia All Familia Non-Seventh Seventh S	re Weather	All Familiar		
Driver Population Weather Type Non-Sevei Incident Type No Incident Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand And Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h All Familia Non-Sevei re Weather) Weather		
Weather Type Incident Type No Incident Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand And Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % 3.00 Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h 7056	re Weather		Weather	
Incident Type Roo Incident Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand And Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % 3.00 Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h No Incident 0.980 0.980 1.000 Demand Adjustment Factor (DAF) 1.000 2910 2910		Non-Severe	Mosther	
Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h O.980 0.980 0.980 0.980 1.000 2910 2910 2910	nt	-	Non-Severe Weather	
Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) 1.000 Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) 1.000 2910 Peak Hour Factor (PHF) 1.000 3.00 Single-Unit Trucks (SUT), %		-		
Demand Adjustment Factor (DAF) 1.000 Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) 1.000 Peak Hour Factor (PHF) 1.000 2910 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.000		0.980		
Demand and CapacityDemand Volume (Vi)2910Peak Hour Factor (PHF)0.95Total Trucks, %3.00Single-Unit Trucks (SUT), %-Tractor-Trailers (TT), %-Heavy Vehicle Adjustment Factor (fHV)0.971Flow Rate (vi),pc/h3155Capacity (c), pc/h7056		0.980		
Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % 3.00 Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h 2910 0.95 3.00 3.00 5.00 7.		1.000		
Peak Hour Factor (PHF) Total Trucks, % 3.00 Single-Unit Trucks (SUT), % - Tractor-Trailers (TT), % - Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h 7056				
Total Trucks, % 3.00 Single-Unit Trucks (SUT), % - Tractor-Trailers (TT), % - Heavy Vehicle Adjustment Factor (fHV) 0.971 Flow Rate (vi),pc/h 3155 Capacity (c), pc/h 7056		190		
Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h 7056		0.95		
Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h 7056		3.00		
Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h 7056		-		
Flow Rate (vi),pc/h 3155 Capacity (c), pc/h 7056		-		
Capacity (c), pc/h 7056		0.971		
1 2 2 2 2		206		
Volume-to-Capacity Ratio (v/c) 0.48		2058		
1		0.10		
Speed and Density				
Upstream Equilibrium Distance (LEQ), ft 796.7 Number o	f Outer Lanes on Freewa	y (No)	1	
Distance to Upstream Ramp (LUP), ft 2091 Speed Ind	ex (Ms)		0.317	
Downstream Equilibrium Distance (LEQ), ft - Flow Oute	r Lanes (vOA), pc/h/ln		1300	
Distance to Downstream Ramp (LDOWN), ft - On-Ramp	Influence Area Speed (SF	R), mi/h	63.5	
Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lan	· ·		70.6	
Flow in Lanes 1 and 2 (v12), pc/h 1855 Ramp Jun	es Freeway Speed (So), m		66.1	
Flow Entering Ramp-Infl. Area (vR12), pc/h 2061 Average D	es Freeway Speed (SO), n ction Speed (S), mi/h	Average Density (D), pc/mi/ln 16.9		
Level of Service (LOS) B Density in	ction Speed (S), mi/h			

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/13/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	Build AM Peak
Project Description	Downstream of SR 520 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3100	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1120
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	73.4
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/8/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	Build AM Peak
Project Description	Upstream of SR 520 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors	-		
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3590	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1297
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	72.6
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.9
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Diverge Report			
Project Information						
Analyst	CDM Smith	า	Date	2,	2/8/2023	
Agency	CDM Smith	า	Analysis Year	20	030	
Jurisdiction	Orange Co	unty	Time Analyzed	Ві	uild AM P	eak
Project Description	Upstream	of SR 520 off-ramp	Units	U.	.S. Custor	nary
Geometric Data						
			Freeway	Ra	amp	
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45	5.0	
Segment Length (L) / Deceleration L	_ength (LA),	ft	1500	23	30	
Terrain Type			Level	Le	evel	
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Ri	ight-Side	d One-Lane
Adjustment Factors						
Driver Population			All Familiar	Al	All Familiar	
Weather Type		Non-Severe Weather	N	Non-Severe Weather		
Incident Type		No Incident	-	-		
Final Speed Adjustment Factor (SAF)			0.980	0.	980	
Final Capacity Adjustment Factor (CAF)		0.980	0.	980		
Demand Adjustment Factor (DAF)		1.000	1.	000		
Demand and Capacity						
Demand Volume (Vi)			3590	10	00	
Peak Hour Factor (PHF)			0.95	0.	95	
Total Trucks, %			3.00	3.	3.00	
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.	0.971	
Flow Rate (vi),pc/h			3892	10	108	
Capacity (c), pc/h			7056	20	2058	
Volume-to-Capacity Ratio (v/c)			0.55	0.	0.05	
Speed and Density						
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes or	n Freeway (N	No)	1
Distance to Upstream Ramp (LUP), fi	t	-	Speed Index (Ds)			0.319
Downstream Equilibrium Distance (l	LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1294	
Distance to Downstream Ramp (LDC	OWN), ft	2091	Off-Ramp Influence Area S	Speed (SR), i	mi/h	63.5
Prop. Freeway Vehicles in Lane 1 and	d 2 (PFD)	0.658	Outer Lanes Freeway Spee	ed (SO), mi/h	า	79.5
Flow in Lanes 1 and 2 (v12), pc/h		2598	Ramp Junction Speed (S),	mi/h		68.1
Flow Entering Ramp-Infl. Area (vR12)), pc/h	-	Average Density (D), pc/m	ni/ln		19.1
Level of Service (LOS)		С	Density in Ramp Influence	Area (DR),	pc/mi/ln	24.5

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/8/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	Build AM Peak
Project Description	SR 520 off-ramp to 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3490	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1261
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	72.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.3
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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	HCS7 Freeway Merge Report						
Project Information							
Analyst	CDM Smit	h	Date	2/8/2023			
Agency	CDM Smit	h	Analysis Year	2030			
Jurisdiction	Orange Co	ounty	Time Analyzed	Build AM F	Peak		
Project Description	SR 520 on- Boulevard	-ramp to Dallas off-ramp	Units	U.S. Custo	mary		
Geometric Data							
			Freeway	Ramp			
Number of Lanes (N), In			3	1			
Free-Flow Speed (FFS), mi/h			75.0	45.0			
Segment Length (L) / Acceleration	Length (LA),	ft	1500	640			
Terrain Type			Level	Level			
Percent Grade, %			-	-			
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane		
Adjustment Factors							
Driver Population		All Familiar	All Familia	r			
Weather Type			Non-Severe Weather	Non-Sever	re Weather		
Incident Type			No Incident	-			
Final Speed Adjustment Factor (SAF)		0.980	0.980				
Final Capacity Adjustment Factor (CAF)		0.980	0.980				
Demand Adjustment Factor (DAF)			1.000	1.000			
Demand and Capacity							
Demand Volume (Vi)			3490	360			
Peak Hour Factor (PHF)			0.95	0.95			
Total Trucks, %			3.00	3.00			
Single-Unit Trucks (SUT), %			-	-			
Tractor-Trailers (TT), %			-	-			
Heavy Vehicle Adjustment Factor (fHV)		0.971	0.971			
Flow Rate (vi),pc/h			3783	390			
Capacity (c), pc/h			7056	2058			
Volume-to-Capacity Ratio (v/c)			0.59	0.19			
Speed and Density							
Upstream Equilibrium Distance (LE	Q), ft	1081.5	Number of Outer Lanes on Free	way (No)	1		
Distance to Upstream Ramp (LUP),	ft	2091	Speed Index (Ms)		0.319		
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1532		
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed	(SR), mi/h	63.5		
Prop. Freeway Vehicles in Lane 1 a	nd 2 (PFM)	0.595	Outer Lanes Freeway Speed (SO)	, mi/h	69.8		
Flow in Lanes 1 and 2 (v12), pc/h		2251	Ramp Junction Speed (S), mi/h		65.7		
Flow Entering Ramp-Infl. Area (vR1	2), pc/h	2641	Average Density (D), pc/mi/ln		21.2		
Level of Service (LOS)		С	Density in Ramp Influence Area	(DR), pc/mi/ln	22.0		

	HCS7 Basic F	reeway Report			
Project Information					
Analyst	CDM Smith	Date	2/8/2023		
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	SR 520 on-ramp to Dallas Boulevard 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	3850	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1391		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	71.8		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	19.4		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freewa	y Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date		2/8/2023	
Agency	CDM Smit	h	Analysis Year		2030	
Jurisdiction	Orange Co	ounty	Time Analyzed		Build AM F	Peak
Project Description	SR 520 on Boulevard	-ramp to Dallas off-ramp	Units		U.S. Custor	mary
Geometric Data					•	
			Freeway		Ramp	
Number of Lanes (N), In			3		1	
Free-Flow Speed (FFS), mi/h			75.0		45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500		230	
Terrain Type			Level		Level	
Percent Grade, %			-		-	
Segment Type / Ramp Type			Freeway		Right-Side	d One-Lane
Adjustment Factors						
Driver Population		All Familiar		All Familiar		
Weather Type			Non-Severe Weather		Non-Severe Weather	
Incident Type		No Incident		-		
Final Speed Adjustment Factor (SAF)		0.980		0.980		
Final Capacity Adjustment Factor (CAF)		0.980		0.980		
Demand Adjustment Factor (DAF)			1.000		1.000	
Demand and Capacity						
Demand Volume (Vi)			3850		120	
Peak Hour Factor (PHF)			0.95		0.95	
Total Trucks, %			3.00		3.00	
Single-Unit Trucks (SUT), %			-		-	
Tractor-Trailers (TT), %			-		-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971		0.971	
Flow Rate (vi),pc/h			4174		130	
Capacity (c), pc/h			7056		2058	
Volume-to-Capacity Ratio (v/c)			0.59		0.06	
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes of	n Freewa	y (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)			0.321
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), po	c/h/ln		1415
Distance to Downstream Ramp (LD	OWN), ft	2519	Off-Ramp Influence Area	Speed (Si	R), mi/h	63.4
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.650	Outer Lanes Freeway Spee	ed (SO), m	ni/h	79.0
Flow in Lanes 1 and 2 (v12), pc/h		2759	Ramp Junction Speed (S),	mi/h		67.9
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/m	ni/ln		20.5
Level of Service (LOS)		С	Density in Ramp Influence	e Area (Di	R), pc/mi/ln	25.9

	HCS7 Basic Fr	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/8/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	Build AM Peak
Project Description	Dallas Boulevard off-ramp to 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	3730	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1348
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	72.2
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.7
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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Analyst CDM Smith Date 2/13/2023 Agency CDM Smith Analysis Year 2030 Jurisdiction Orange County Time Analyzed Build AM Peak	HCS7 Freeway Merge Report							
Agency CDM Smith Analysis Year 2030 Jurisdiction Orange County Time Analyzed Build AM Peak Project Description Dallas Boulevard on-ramp to Innovation Way off-ramp Geometric Data Freeway Ramp	Project Information							
Durisdiction Dur	Analyst	CDM Smit	า	Date	2/13/2023			
Project Description Dallas Boulevard on-ramp to Innovation Way off-ramp Project Description Dallas Boulevard on-ramp to Innovation Way off-ramp Preveway Ramp Ramp Ramp Reference Reference Ramp Ramp Ramp Ramp Ramp Reference Ramp Ram	Agency	CDM Smit	า	Analysis Year	2030			
Innovation Way off-ramp	Jurisdiction	Orange Co	unty	Time Analyzed	Build AM F	Peak		
Freeway Ramp Number of Lanes (N), In 3 1	Project Description			Units	U.S. Custo	mary		
Number of Lanes (N), In 75.0 45.0 Free-Flow Speed (FFS), mi/h 75.0 45.0 Segment Length (L) / Acceleration Length (LA), It 1500 82.5 Terrain Type	Geometric Data							
Free-Flow Speed (FFS), mi/h Segment Length (L) / Acceleration Length (LA),ft 1500 825 Terrain Type Level Level Level Percent Grade, % Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Torriver Population All Familiar Weather Type Non-Severe Weather Non-Severe Weath				Freeway	Ramp			
Segment Length (L) / Acceleration Length (LA),ft 1500 825 Terrain Type Level Level Percent Grade, % - - Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand And Capacity Demand Volume (V) 3730 670 Demand Trucks (SUT), % - - Total Trucks (SUT), % - - Total Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (Hv) 0.971 0.971 Flow Rate (vi),pc/h 0.9	Number of Lanes (N), In	Number of Lanes (N), In		3	1			
Terrain Type Level Level Percent Grade, % - - Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand and Capacity Demand Adjustment Factor (DAF) 0.980 0.980 Demand Adjustment Factor (PHF) 0.95 0.95 Total Trucks (SUT), % - - - Tractor (Trailers (TT), % - - - <td <="" colspan="2" td=""><td>Free-Flow Speed (FFS), mi/h</td><td></td><td></td><td>75.0</td><td>45.0</td><td></td></td>	<td>Free-Flow Speed (FFS), mi/h</td> <td></td> <td></td> <td>75.0</td> <td>45.0</td> <td></td>		Free-Flow Speed (FFS), mi/h			75.0	45.0	
Percent Grade, % - - -	Segment Length (L) / Acceleration	Length (LA),	ft	1500	825			
Freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No locident	Terrain Type			Level	Level			
Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (DAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Adjustment Factor (DAF) 3730 670 Demand Volume (VI) 3730 670 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, 3(SUT), % - - Tractor-Trailers (TT), % - - Flow Rate (w), pc/h 4044 726 Capacity (c), pc/h 4044 726 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (w/c) 0.68 0.35 Speed and Density Upstream Equilibrium Distance (LEQ), ft 191.4 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2519 Speed Index (Ms)<	Percent Grade, %			-	-			
All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (DAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Capacity Demand Volume (Vi) 3730 670 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi), pc/h 4044 726 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.68 0.35 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1291.4 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2519 Speed Index (Ms) 0.340 </td <td>Segment Type / Ramp Type</td> <td></td> <td></td> <td>Freeway</td> <td>Right-Side</td> <td>d One-Lane</td>	Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane		
Non-Severe Weather Non-Severe Weather Non-Severe Weather	Adjustment Factors							
No Incident Type	Driver Population		All Familiar	All Familia				
Final Speed Adjustment Factor (SAF) 0.980 0.980 0.980 0.980 0.980 Demand Adjustment Factor (CAF) 0.980 0.980 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand And Capacity Demand Volume (Vi) 3730 670 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), %	Weather Type			Non-Severe Weather	Non-Sever	e Weather		
Final Capacity Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand and Capacity Demand Volume (Vi) 3730 670 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi), pc/h 4044 726 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.68 0.35 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1291.4 Number of Outer Lanes on Freeway (No) 1 Distance to Upstream Ramp (LuP), ft 2519 Speed Index (MS) 0.340 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1614 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 62.8 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.601 Outer Lanes Freeway Speed (So), mi/h 69.5 Flow in Lanes 1 and 2 (v12), pc/h 2430 Ramp Junction Speed (S), mi/h 64.9	Incident Type		No Incident	-				
Demand Adjustment Factor (DAF) 1,000 1,000 Demand and Capacity Demand Volume (Vi) 3730 670 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi), pc/h 4044 726 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.68 0.35 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1291.4 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2519 Speed Index (MS) 0.340 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1614 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 62.8	Final Speed Adjustment Factor (SAF)			0.980	0.980			
Demand and Capacity Demand Volume (Vi) 3730 670 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHV) 0.971 0.971 Flow Rate (wi), pc/h 4044 726 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.68 0.35 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1291.4 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2519 Speed Index (Ms) 0.340 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/In 1614 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 62.8 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.601 Outer Lanes Freeway Speed (SO), mi/h 69.5 Flow in Lanes 1 and 2 (V12), pc/h 2430 Ramp Junction Speed (S), mi/h	Final Capacity Adjustment Factor (CAF)		0.980	0.980				
Demand Volume (Vi) 3730 670 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi),pc/h 4044 726 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.68 0.35 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1291.4 Number of Outer Lanes on Freeway (No) 1 Distance to Upstream Ramp (LUP), ft 2519 Speed Index (Ms) 0.340 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (voA), pc/h/ln 1614 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 62.8 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.601 Outer Lanes Freeway Speed (SO), mi/h 69.5 Flow in Lanes 1 and 2 (V12), pc/h 2430 Ramp Junction Speed (S), mi/h 64.9	Demand Adjustment Factor (DAF)			1.000	1.000			
Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi),pc/h 4044 726 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.68 0.35 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1291.4 Number of Outer Lanes on Freeway (No) 1 Distance to Upstream Ramp (LUP), ft 2519 Speed Index (Ms) 0.340 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (voA), pc/h/ln 1614 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 62.8 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.601 Outer Lanes Freeway Speed (SO), mi/h 64.9 Flow in Lanes 1 and 2 (v12), pc/h 2430 Ramp Junction Speed (S), mi/h 64.9	Demand and Capacity							
3.00 3.00 3.00 Single-Unit Trucks (SUT), % - - - - - - - - -	Demand Volume (Vi)			3730	0 670			
Single-Unit Trucks (SUT), % - - - - - - - - -	Peak Hour Factor (PHF)			0.95	0.95			
Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHv) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Ramp (LUP), ft Distance to Downstream Ramp (LDOWN), ft Capacity (c), pc/h Downstream Equilibrium Distance (LEQ), ft Capacity (c), pc/h Distance to Upstream Ramp (LUP), ft Distance to Downstream Equilibrium Distance (LEQ), ft Capacity (c), pc/h Distance to Downstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Downstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Downstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Downstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Downstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Downstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Downstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft Capacity (c), pc/h Distance to Upstream Ramp (LDOWN), ft C	Total Trucks, %			3.00	3.00			
Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Ramp (LUP), ft Distance to Upstream Equilibrium Distance (LEQ), ft Distance to Downstream Ramp (LDOWN), ft Prop. Freeway Vehicles in Lane 1 and 2 (PFM) Flow in Lanes 1 and 2 (v12), pc/h Ramp Junction Speed (S), mi/h 64.9	Single-Unit Trucks (SUT), %			-	-			
Flow Rate (vi),pc/h Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Ramp (LUP), ft Distance to Upstream Equilibrium Distance (LEQ), ft The prop. Freeway Vehicles in Lane 1 and 2 (PFM) Flow in Lanes 1 and 2 (v12), pc/h A044 726 7056 2058 0.35 Number of Outer Lanes on Freeway (NO) 1 Speed Index (Ms) Flow Outer Lanes (vOA), pc/h/ln 62.8 On-Ramp Influence Area Speed (SR), mi/h 69.5 Flow in Lanes 1 and 2 (v12), pc/h 2430 Ramp Junction Speed (S), mi/h 64.9	Tractor-Trailers (TT), %			-	-			
Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 7056 0.68 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft 1291.4 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2519 Speed Index (MS) Downstream Equilibrium Distance (LEQ), ft Flow Outer Lanes (vOA), pc/h/ln 1614 Distance to Downstream Ramp (LDOWN), ft On-Ramp Influence Area Speed (SR), mi/h 62.8 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.601 Outer Lanes Freeway Speed (SO), mi/h 64.9	Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971			
Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft	Flow Rate (vi),pc/h			4044	726			
Speed and DensityUpstream Equilibrium Distance (LEQ), ft1291.4Number of Outer Lanes on Freeway (NO)1Distance to Upstream Ramp (LUP), ft2519Speed Index (Ms)0.340Downstream Equilibrium Distance (LEQ), ft-Flow Outer Lanes (vOA), pc/h/ln1614Distance to Downstream Ramp (LDOWN), ft-On-Ramp Influence Area Speed (SR), mi/h62.8Prop. Freeway Vehicles in Lane 1 and 2 (PFM)0.601Outer Lanes Freeway Speed (SO), mi/h69.5Flow in Lanes 1 and 2 (v12), pc/h2430Ramp Junction Speed (S), mi/h64.9	Capacity (c), pc/h			7056	2058			
Upstream Equilibrium Distance (LEQ), ft 1291.4 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2519 Speed Index (MS) 0.340 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1614 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 62.8 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.601 Outer Lanes Freeway Speed (SO), mi/h 69.5 Flow in Lanes 1 and 2 (v12), pc/h 2430 Ramp Junction Speed (S), mi/h 64.9	Volume-to-Capacity Ratio (v/c)			0.68	0.35			
Distance to Upstream Ramp (LUP), ft 2519 Speed Index (MS) 0.340 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1614 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 62.8 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.601 Outer Lanes Freeway Speed (SO), mi/h 69.5 Flow in Lanes 1 and 2 (v12), pc/h 2430 Ramp Junction Speed (S), mi/h 64.9	Speed and Density							
Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1614 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 62.8 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.601 Outer Lanes Freeway Speed (SO), mi/h 69.5 Flow in Lanes 1 and 2 (v12), pc/h 2430 Ramp Junction Speed (S), mi/h 64.9	Upstream Equilibrium Distance (LE	Q), ft	1291.4	Number of Outer Lanes on Fr	eeway (No)	1		
Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 62.8 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.601 Outer Lanes Freeway Speed (SO), mi/h 69.5 Flow in Lanes 1 and 2 (v12), pc/h 2430 Ramp Junction Speed (S), mi/h 64.9	Distance to Upstream Ramp (LUP),	ft	2519	Speed Index (Ms)		0.340		
Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.601 Outer Lanes Freeway Speed (SO), mi/h 69.5 Flow in Lanes 1 and 2 (v12), pc/h 2430 Ramp Junction Speed (S), mi/h 64.9	Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/	/ln	1614		
Flow in Lanes 1 and 2 (v12), pc/h 2430 Ramp Junction Speed (S), mi/h 64.9	Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Spec	ed (SR), mi/h	62.8		
	Prop. Freeway Vehicles in Lane 1 ar	o. Freeway Vehicles in Lane 1 and 2 (PFM) 0.601 Outer Lanes Freeway Speed (SC		So), mi/h	69.5			
Flow Entering Ramp-Infl. Area (vR12), pc/h 3156 Average Density (D), pc/mi/ln 24.5	Flow in Lanes 1 and 2 (v12), pc/h		2430	Ramp Junction Speed (S), mi/	′h	64.9		
	Flow Entering Ramp-Infl. Area (vR1	2), pc/h	3156	Average Density (D), pc/mi/ln	1	24.5		
Level of Service (LOS) C Density in Ramp Influence Area (DR), pc/mi/In 24.7	Level of Service (LOS)		С	Density in Ramp Influence Are	ea (DR), pc/mi/ln	24.7		

DM Smith DM Smith range County allas Boulevard on-ramp Innovation Way off- mp	Date Analysis Year Time Analyzed Units Terrain Type	2/13/2023 2030 Build AM Peak U.S. Customary
OM Smith range County allas Boulevard on-ramp Innovation Way off-	Analysis Year Time Analyzed Units	2030 Build AM Peak
range County allas Boulevard on-ramp Innovation Way off-	Time Analyzed Units	Build AM Peak
allas Boulevard on-ramp Innovation Way off-	Units	
Innovation Way off-		U.S. Customary
	Tarrain Tyna	
	Terrain Tyne	1
	Terrain Type	Level
	Percent Grade, %	-
easured	Grade Length, mi	-
	Total Ramp Density (TRD), ramps/mi	-
	Free-Flow Speed (FFS), mi/h	75.0
ostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
on-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
o Incident	Demand Adjustment Factor (DAF)	1.000
400	Heavy Vehicle Adjustment Factor (fHV)	0.971
95	Flow Rate (V _p), pc/h/ln	1590
00	Capacity (c), pc/h/ln	2400
	Adjusted Capacity (cadj), pc/h/ln	2352
	Volume-to-Capacity Ratio (v/c)	0.68
00		
	Average Speed (S), mi/h	69.6
	Density (D), pc/mi/ln	22.8
	Level of Service (LOS)	С
3.5		
000000000000000000000000000000000000000	ostly Familiar n-Severe Weather Incident 00 5 0 HCSTM Freewa	Total Ramp Density (TRD), ramps/mi Free-Flow Speed (FFS), mi/h Postly Familiar Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Incident Demand Adjustment Factor (DAF) Demand Adjustment Factor (FHV) Flow Rate (Vp), pc/h/ln Capacity (c), pc/h/ln Adjusted Capacity (cadj), pc/h/ln Volume-to-Capacity Ratio (v/c) Average Speed (S), mi/h Density (D), pc/mi/ln Level of Service (LOS)

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HCS7 Freeway Diverge Report						
Project Information						
Analyst	CDM Smitl	h	Date 2/13/202			
Agency	CDM Smitl	h	Analysis Year	2030		
Jurisdiction	Orange Co	ounty	Time Analyzed	Build AM F	Peak	
Project Description			Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), ln			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration	Length (LA),	ft	1500	270		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population		All Familiar	All Familia			
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SA	F)		0.980	0.980		
Final Capacity Adjustment Factor (CAF)			0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	1.000	
Demand and Capacity						
Demand Volume (Vi)			4400	150		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00		
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			4770	163		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)			0.68	0.08		
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freeway (No)		1	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (DS)		0.324	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1691		1691	
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Spee	ed (SR), mi/h	63.3	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.633	Outer Lanes Freeway Speed (S	SO), mi/h	77.9	
Flow in Lanes 1 and 2 (v12), pc/h		3079	Ramp Junction Speed (S), mi/l	h	67.8	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		23.5	
Level of Service (LOS)		D	Density in Ramp Influence Area (DR), pc/mi/ln 28.3		28.3	

	HCS7 Basic Fr	eeway Report			
Project Information					
Analyst	CDM Smith	Date	2/13/2023		
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	Downstream of Innovation Way 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	4250	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1536		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	70.3		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.8		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/8/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	Build PM Peak
Project Description	Upstream of Innovation Way 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4140	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1496
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	70.8
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	21.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freewa	y Merge Report		
Project Information					
Analyst	CDM Smit	า	Date	2/8/2023	
Agency	CDM Smit	า	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM F	Peak
Project Description	Project Description Innovation Way on-rar Dallas Boulevard off-ra		Units	U.S. Custo	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	908	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population		All Familiar	All Familia		
Weather Type		Non-Severe Weather	Non-Sever	e Weather	
Incident Type		No Incident	-		
Final Speed Adjustment Factor (SAF)		0.980	0.980		
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			4140	150	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			4488	163	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.66	0.08	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms)		0.310
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 17		1782
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (S	SR), mi/h	63.7
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.603	Outer Lanes Freeway Speed (SO),	mi/h	68.9
Flow in Lanes 1 and 2 (v12), pc/h		2706	Ramp Junction Speed (S), mi/h		65.6
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2869	Average Density (D), pc/mi/ln		23.6
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 22.2		22.2

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/8/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	Build PM Peak
Project Description	Innovation Way on-ramp to Dallas Boulevard 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4290	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1550
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.66
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	70.1
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.1
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	y Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	2/8/2023	
Agency	CDM Smit	h	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM F	Peak
Project Description	Project Description Innovation Way on-rar Dallas Boulevard off-ra		Units	U.S. Custo	mary
Geometric Data				·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	825	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population		All Familiar	All Familia	r	
Weather Type		Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			4290	560	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			4651	607	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.66	0.29	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freev	vay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (DS)		0.364
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	Flow Outer Lanes (vOA), pc/h/ln 1553	
Distance to Downstream Ramp (LD	OWN), ft	2519	Off-Ramp Influence Area Speed	(SR), mi/h	62.0
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.616	Outer Lanes Freeway Speed (SO)	mi/h	78.5
Flow in Lanes 1 and 2 (v12), pc/h		3098	Ramp Junction Speed (S), mi/h		66.7
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		23.2
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 23.5		23.5

HCS7 Basic Freeway Report					
Project Information					
Analyst	CDM Smith	Date	2/13/2023		
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	Build PM Peak		
Project Description	Dallas Boulevard off-ramp to 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	3730	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1348		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	72.2		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	18.7		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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HCS7 Freeway Merge Report						
Project Information						
Analyst	CDM Smith	n	Date	2/13/2023		
Agency	CDM Smith	n	Analysis Year	2030		
Jurisdiction	Orange Co	unty	Time Analyzed	Build PM F	Peak	
Project Description Dallas Boulevard on-ramp to S 520 off-ramp		levard on-ramp to SR np	Units	U.S. Custo	mary	
Geometric Data				<u> </u>		
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Acceleration I	_ength (LA),	ft	1500	390		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population		All Familiar	All Familia	r		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type		No Incident	-			
Final Speed Adjustment Factor (SAF	-)		0.980	0.980		
Final Capacity Adjustment Factor (C	AF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			3730	100		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (fi	HV)		0.971	0.971		
Flow Rate (vi),pc/h			4044	108		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)			0.59	0.05		
Speed and Density						
Upstream Equilibrium Distance (LEC	ι), ft	966.0	Number of Outer Lanes on Freeway (No)		1	
Distance to Upstream Ramp (LUP), f	t	2519	Speed Index (Ms)		0.333	
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1666		1666	
Distance to Downstream Ramp (LDG	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h 6		63.0	
Prop. Freeway Vehicles in Lane 1 an	d 2 (PFM)	0.588	Outer Lanes Freeway Speed (So	O), mi/h	69.3	
Flow in Lanes 1 and 2 (v12), pc/h		2378	Ramp Junction Speed (S), mi/h		65.4	
Flow Entering Ramp-Infl. Area (vR12), pc/h	2486	Average Density (D), pc/mi/ln		21.2	
Level of Service (LOS)		С	Density in Ramp Influence Area	a (DR), pc/mi/ln	22.4	
Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (find Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LECT Distance to Upstream Ramp (LUP), find Downstream Equilibrium Distance (Distance to Downstream Ramp (LDC Prop. Freeway Vehicles in Lane 1 and 1 and 2 (v12), pc/h Flow Entering Ramp-Infl. Area (vR12)	it LEQ), ft DWN), ft id 2 (PFM)	2519 - - 0.588 2378 2486	3.00 0.971 4044 7056 0.59 Number of Outer Lanes on Free Speed Index (MS) Flow Outer Lanes (vOA), pc/h/lr On-Ramp Influence Area Speed Outer Lanes Freeway Speed (Sc Ramp Junction Speed (S), mi/h Average Density (D), pc/mi/ln	3.00 0.971 108 2058 0.05 eway (NO) d (SR), mi/h D), mi/h	0.333 1666 63.0 69.3 65.4 21.2	

	HCS7 Basic Freeway Report					
Project Information						
ith	Date	2/13/2023				
ith	Analysis Year	2030				
County	Time Analyzed	Build PM Peak				
oulevard on-ramp O off-ramp	Units	U.S. Customary				
	Terrain Type	Level				
	Percent Grade, %	-				
d	Grade Length, mi	-				
	Total Ramp Density (TRD), ramps/mi	-				
	Free-Flow Speed (FFS), mi/h	75.0				
amiliar	Final Speed Adjustment Factor (SAF)	0.980				
ere Weather	Final Capacity Adjustment Factor (CAF)	0.980				
ent	Demand Adjustment Factor (DAF)	1.000				
	Heavy Vehicle Adjustment Factor (fHV)	0.971				
	Flow Rate (V _p), pc/h/ln	1384				
	Capacity (c), pc/h/ln	2400				
	Adjusted Capacity (cadj), pc/h/ln	2352				
	Volume-to-Capacity Ratio (v/c)	0.59				
	Average Speed (S), mi/h	71.9				
		11.5				
	Density (D), pc/mi/ln	19.2				
	<u> </u>					
•	ere Weather	Final Speed Adjustment Factor (SAF) Pere Weather Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Heavy Vehicle Adjustment Factor (fHV) Flow Rate (Vp), pc/h/ln Capacity (c), pc/h/ln Adjusted Capacity (cadj), pc/h/ln Volume-to-Capacity Ratio (v/c)				

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		HCS7 Freeway	Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	2/13/2023	
Agency	CDM Smit	h	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM F	Peak
Project Description	Project Description Dallas Boulevard on-ramp to SF 520 off-ramp		Units	U.S. Custo	mary
Geometric Data			·	·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	240	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population		All Familiar	All Familia		
Weather Type		Non-Severe Weather	Non-Sever	e Weather	
Incident Type		No Incident	-		
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			3830	560	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			4152	607	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.59	0.29	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freev	vay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.364
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1319
Distance to Downstream Ramp (LD	OWN), ft	2091	Off-Ramp Influence Area Speed	(SR), mi/h	62.0
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.628	Outer Lanes Freeway Speed (SO),	mi/h	79.4
Flow in Lanes 1 and 2 (v12), pc/h		2833	Ramp Junction Speed (S), mi/h		66.6
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		20.8
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 26.5		26.5

HCS7 Basic Freeway Report Project Information					
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	Build PM Peak		
Project Description	SR 520 off-ramp to 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	3270	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1182		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	73.2		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.1		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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	HCS7 Freeway Merge Report					
Project Information						
Analyst	CDM Smith	า	Date	2/13/2023		
Agency	CDM Smith	า	Analysis Year	2030		
Jurisdiction	Orange Co	unty	Time Analyzed	Build PM F	Peak	
Project Description	Downstrea	m of SR 520 on-ramp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Acceleration	Length (LA),	ft	1500	390		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors				<u> </u>		
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	Non-Severe Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SA	Final Speed Adjustment Factor (SAF)			0.980		
Final Capacity Adjustment Factor (CAF)			0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			3270 100			
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00		
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	·HV)		0.971	0.971		
Flow Rate (vi),pc/h			3545	108		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)			0.52	0.05		
Speed and Density						
Upstream Equilibrium Distance (LE	Q), ft	859.2	Number of Outer Lanes on Freew	ay (No)	1	
Distance to Upstream Ramp (LUP),	ft	2091	Speed Index (Ms)		0.322	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1461	
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h		63.4	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.588	Outer Lanes Freeway Speed (SO), mi/h		70.0	
Flow in Lanes 1 and 2 (v12), pc/h		2084			65.9	
Flow Entering Ramp-Infl. Area (vR1	2), pc/h	2192	Average Density (D), pc/mi/ln 18.5		18.5	
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln	20.2	
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	HCS7 Basic F	reeway Report				
Project Information						
Analyst	CDM Smith	Date	2/13/2023			
Agency	CDM Smith	Analysis Year	2030			
Jurisdiction	Orange County	Time Analyzed	Build PM Peak			
Project Description	Downstream of SR 520 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	75.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors						
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980			
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980			
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000			
Demand and Capacity						
Demand Volume veh/h	3370	Heavy Vehicle Adjustment Factor (fHV)	0.971			
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1218			
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352			
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	73.0			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.7			
Total Ramp Density Adjustment	-	Level of Service (LOS)	В			
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5					

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	HCS7 Basic F	reeway Report			
Project Information					
Analyst	CDM Smith	Date	2/8/2023		
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	Build PM Peak		
Project Description	Upstream of SR 520 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	3320	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _P), pc/h/ln	1200		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	73.1		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.4		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

HCSTM Freeways Version 7.9.6 2030 PM WB_1.xuf

Project Information CDM Smith Date 2,6/2023			HCS7 Freeway	Diverge Report			
Agency CDM Smith	Project Information						
Direst Direct	Analyst	CDM Smitl	n	Date	2/8/2023		
Project Description Optimizer SR 520 off-ramp Units Optimizer SR 520 off-ramp Units Optimizer SR 520 off-ramp Optimizer SR 520	Agency	CDM Smitl	n	Analysis Year	2030		
Freeway	Jurisdiction	Orange Co	unty	Time Analyzed	Build PM F	Peak	
Number of Lanes (N), In 3 1 1 1 1 1 1 1 1 1	Project Description	Upstream	of SR 520 off-ramp	Units	U.S. Custo	mary	
Number of Lanes (N), In 3 1	Geometric Data						
Free-Flow Speed (FFS), mi/h 75.0 45.0 Segment Length (L/) / Deceleration Length (LA), ft 1500 230 ————————————————————————————————————				Freeway	Ramp		
Segment Length (L) / Deceleration Length (LA). It 1500 230 Terrain Type Level Level Percent Grade, % - - Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Meather Type Non-Severe Weather Non-Severe Weather No Incident Non-Severe Weather Incident Type Non-Severe Weather Final Speed Adjustment Factor (SAF) 0,980 0,980 Final Speed Adjustment Factor (CAF) 0,980 0,980 Final Speed Adjustment Factor (CAF) 0,980 0,980 Demand Adjustment Factor (CAF) 0,980 0,980 Demand Capacity Demand Capacity Demand Capacity 3320 190 Peak Hour Factor (PHF) 0,95 0,95 Total Trucks (SUT), % 0,971 0,971 Total Trucks (SUT), % 0,971 0,971 <td>Number of Lanes (N), In</td> <td></td> <td></td> <td>3</td> <td>1</td> <td></td>	Number of Lanes (N), In			3	1		
Terrain Type	Free-Flow Speed (FFS), mi/h			75.0	45.0		
Percent Grade, % -	Segment Length (L) / Deceleration I	Length (LA),	ft	1500	230		
Segment Type / Ramp Type Reway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0,980 0,980 Final Speed Adjustment Factor (CAF) 0,980 0,980 Demand Adjustment Factor (CAF) 0,990 0,980 Demand Adjustment Factor (PHP) 0,95 0,95 Demand Adjustment Factor (PHP) 0,95 0,95 Demand Volume (V) 0,95 0,95 Demand Volume (V) 0,95 0,95 Demand Volume (V) 0,99 0,95 <td>Terrain Type</td> <td></td> <td></td> <td>Level</td> <td>Level</td> <td></td>	Terrain Type			Level	Level		
Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0,980 0,980 Final Capacity Adjustment Factor (DAF) 0,980 0,980 Demand Adjustment Factor (DAF) 1,000 1,000 Demand Adjustment Factor (DAF) 3320 190 Demand Volume (V) 3320 190 Peak Hour Factor (PHF) 0,95 0,95 Total Trucks (SUT), % - - Tractor-Trailers (TT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (HIV) 0,971 0,971 0,971 Heavy Vehicle Adjustment Factor (HIV) 5599 206 - Capacity (c), pc/h 0,51 0,10 - Speed and Density Upstream Equilibrium Distance (LEQ), ft Number of Oute	Percent Grade, %			-	-		
Driver Population All Familiar All Familiar All Familiar All Familiar Non-Severe Weather Non-Severe Weather Non-Severe Weather Non-Severe Weather Incident Type Non-Severe Weather Final Speed Adjustment Factor (SAF) 0.980 0.990 0.95 0.95 0.95 0.95 0.95 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97 0.97	Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0,980 0,980 Final Capacity Adjustment Factor (CAF) 0,980 0,980 Demand Adjustment Factor (DAF) 1,000 1,000 Demand Adjustment Factor (PAF) 3320 190 Demand Volume (VI) 3320 190 Peak Hour Factor (PHF) 0,95 0,95 Total Trucks, % 3,00 3,00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (HvV) 0,971 0,971 Flow Rate (vi),pc/h 3599 206 Capacity (c), pc/h 0,51 0,10 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) 0,328 Downstream Equilibrium Distance (LEQ), ft Number of Outer Lanes (voA), pc/h/ln	Adjustment Factors						
Incident Type	Driver Population			All Familiar	All Familia	r	
Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand and Capacity Demand Volume (Vi) 3320 190 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHV) 0.971 0.971 Heavy Vehicle Adjustment Factor (fHV) 3599 206 Capacity (c), pc/h 2058 Volume-to-Capacity Ratio (v/c) 5051 0.10 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) 0.328 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1150 Distance to Downstream Ramp (LDOWN), ft	Weather Type			Non-Severe Weather	Non-Sever	Non-Severe Weather	
Final Capacity Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand And Capacity Demand Volume (Vi) 3320 190 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi),pc/h 3599 206 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.51 0.10 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) 0.328 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (voA), pc/h/n 1150 Distance to Downstream Ramp (LUP), ft - Speed Index (DS) , mi/h 63.2 Prop. Freeway Vehicles in Lane 1 a	Incident Type			No Incident	-		
Demand Adjustment Factor (DAF) 1,000 1,000 Demand and Capacity Demand Volume (V) 3320 190 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi), pc/h 3599 206 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.51 0.10 Speed and Density Upstream Equilibrium Distance (LEQ), ft - Number of Outer Lanes on Freeway (No) 1 Distance to Upstream Ramp (LEQ), ft - Number of Outer Lanes on Freeway (No) 0.328 Downstream Equilibrium Distance (LEQ), ft - Number of Outer Lanes (vOA), pc/h/ln 1150 Distance to Upstream Ramp (LDOWN), ft - Speed Index (DS) , mi,/h 63.2	Final Speed Adjustment Factor (SAF	:)		0.980	0.980		
Demand and Capacity Demand Volume (Vi) 3320 190 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHV) 0.971 0.971 Flow Rate (vi), pc/h 3599 206 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.51 0.10 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) 0.328 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (voA), pc/h/In 1150 Distance to Downstream Ramp (LUP), ft - Speed Index (Ds) , mi/h 63.2 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.661 Outer Lanes Freeway Speed (So), mi/h 80.0 Flow in Lanes 1 and 2 (V12), pc/h 2449 Ramp Junction Speed (S), mi/h 67	Final Capacity Adjustment Factor (CAF)		0.980	0.980			
Demand Volume (Vi) 3320 190 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi),pc/h 3599 206 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.51 0.10 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) 0.328 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/In 1150 Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (Sn), mi/h 63.2 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.661 Outer Lanes Freeway Speed (SO), mi/h 80.0 Flow in Lanes 1 and 2 (v12), pc/h 2449 Ramp Junction Speed (S), mi/h 67.7 Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln 1	Demand Adjustment Factor (DAF)			1.000	1.000		
Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 3.00 Single-Unit Trucks (SUT), % - - - Tractor-Trailers (TT), % - - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 0.971 Flow Rate (vi),pc/h 3599 206 - Capacity (c), pc/h 7056 2058 - Volume-to-Capacity Ratio (v/c) 0.51 0.10 - 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) 0.328 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (voA), pc/h/ln 1150 Distance to Downstream Ramp (LDown), ft 2091 Off-Ramp Influence Area Speed (S), mi/h 63.2 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.661 Outer Lanes Freeway Speed (So), mi/h 80.0 Flow in Lanes 1 and 2 (v12), pc/h 2449 Ramp Junction Speed (S),	Demand and Capacity						
Total Trucks, % 3.00 3.00 3.00 Single-Unit Trucks (SUT), %	Demand Volume (Vi)			3320	190		
Single-Unit Trucks (SUT), % - <td>Peak Hour Factor (PHF)</td> <td></td> <td></td> <td>0.95</td> <td>0.95</td> <td></td>	Peak Hour Factor (PHF)			0.95	0.95		
Tractor-Trailers (TT), % -	Total Trucks, %			3.00	3.00		
Heavy Vehicle Adjustment Factor (fHv) Flow Rate (vi),pc/h Capacity (c), pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Ramp (LUP), ft Distance to Downstream Ramp (LDOWN), ft Distance to	Single-Unit Trucks (SUT), %			-	-	-	
Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Ramp (LUP), ft Distance to Downstream Ramp (LDOWN), ft Distance to Downstream Ramp (LDOWN), ft Prop. Freeway Vehicles in Lane 1 and 2 (PFD) Flow in Lanes 1 and 2 (v12), pc/h Flow Entering Ramp-Infl. Area (vR12), pc/h Average Density (D), pc/mi/ln 206 3599 206 3599 205 3058 0.10 Speed and Density 108 3599 207 3598 309 309 109 119 1150 1150 3032 3032 4032 4032 4049 405 4061 406	Tractor-Trailers (TT), %			-	-	-	
Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Ramp (LUP), ft Distance to Downstream Ramp (LDOWN), ft Distance to Downstr	Heavy Vehicle Adjustment Factor (fi	⊣V)		0.971	0.971		
Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Ramp (LUP), ft Distance to Downstream Ramp (LDOWN), ft Distance to Downstream Ramp (LD	Flow Rate (vi),pc/h			3599	206		
Speed and DensityUpstream Equilibrium Distance (LEQ), ft-Number of Outer Lanes on Freeway (NO)1Distance to Upstream Ramp (LUP), ft-Speed Index (DS)0.328Downstream Equilibrium Distance (LEQ), ft-Flow Outer Lanes (vOA), pc/h/ln1150Distance to Downstream Ramp (LDOWN), ft2091Off-Ramp Influence Area Speed (SR), mi/h63.2Prop. Freeway Vehicles in Lane 1 and 2 (PFD)0.661Outer Lanes Freeway Speed (SO), mi/h80.0Flow in Lanes 1 and 2 (v12), pc/h2449Ramp Junction Speed (S), mi/h67.7Flow Entering Ramp-Infl. Area (vR12), pc/h-Average Density (D), pc/mi/ln17.7	Capacity (c), pc/h			7056	2058	2058	
Upstream Equilibrium Distance (LEQ), ft - Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft - Speed Index (DS) 0.328 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1150 Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (SR), mi/h 63.2 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.661 Outer Lanes Freeway Speed (SO), mi/h 80.0 Flow in Lanes 1 and 2 (v12), pc/h 2449 Ramp Junction Speed (S), mi/h 67.7 Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln 17.7	Volume-to-Capacity Ratio (v/c)			0.51	0.10		
Distance to Upstream Ramp (LUP), ft - Speed Index (DS) Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (SR), mi/h 63.2 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) O.661 Outer Lanes Freeway Speed (SO), mi/h Flow in Lanes 1 and 2 (v12), pc/h Prop. Freeway Speed (SO), mi/h Average Density (D), pc/mi/ln 17.7	Speed and Density						
Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 1150 Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (SR), mi/h 63.2 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.661 Outer Lanes Freeway Speed (SO), mi/h 80.0 Flow in Lanes 1 and 2 (v12), pc/h 2449 Ramp Junction Speed (S), mi/h 67.7 Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln 17.7	Upstream Equilibrium Distance (LEC)), ft	-	Number of Outer Lanes on Free	way (No)	1	
Distance to Downstream Ramp (LDOWN), ft 2091 Off-Ramp Influence Area Speed (SR), mi/h 63.2 Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.661 Outer Lanes Freeway Speed (SO), mi/h 80.0 Flow in Lanes 1 and 2 (v12), pc/h 2449 Ramp Junction Speed (S), mi/h 67.7 Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln 17.7	Distance to Upstream Ramp (LUP), f	t	-	Speed Index (Ds)		0.328	
Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.661 Outer Lanes Freeway Speed (SO), mi/h Ramp Junction Speed (S), mi/h 67.7 Flow Entering Ramp-Infl. Area (vR12), pc/h Average Density (D), pc/mi/ln 17.7	Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		1150	
Flow in Lanes 1 and 2 (v12), pc/h Flow Entering Ramp-Infl. Area (vR12), pc/h Average Density (D), pc/mi/ln 17.7	Distance to Downstream Ramp (LD0	OWN), ft	2091	Off-Ramp Influence Area Speed (SR), mi/h		63.2	
Flow Entering Ramp-Infl. Area (vR12), pc/h - Average Density (D), pc/mi/ln 17.7	Prop. Freeway Vehicles in Lane 1 an	d 2 (PFD)	0.661	Outer Lanes Freeway Speed (SO), mi/h		80.0	
	Flow in Lanes 1 and 2 (v12), pc/h		2449	Ramp Junction Speed (S), mi/h		67.7	
Level of Service (LOS) C Density in Ramp Influence Area (DR), pc/mi/ln 23.2	Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln 17.7		17.7	
	Level of Service (LOS)		С	Density in Ramp Influence Area	(DR), pc/mi/ln	23.2	

	HCS7 Basic F	reeway Report			
Project Information					
Analyst	CDM Smith	Date	2/8/2023		
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	Build PM Peak		
Project Description	SR 520 off-ramp to 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	3130	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1131		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	73.3		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	15.4		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freewa	y Merge Report		
Project Information					
Analyst	CDM Smit	า	Date	2/8/2023	
Agency	CDM Smit	า	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM F	Peak
Project Description	SR 520 on- Boulevard	ramp to Dallas off-ramp	Units	U.S. Custon	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	640	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors				•	
Driver Population			All Familiar	All Familia	•
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type		No Incident	-		
Final Speed Adjustment Factor (SAI	=)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)			0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			3130 360		
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			3393	390	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.54	0.19	
Speed and Density					
Upstream Equilibrium Distance (LEC	Q), ft	998.0	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	2091	Speed Index (MS)		0.308
Downstream Equilibrium Distance ((LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1374		1374
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (S	SR), mi/h	63.8
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.595	Outer Lanes Freeway Speed (SO), mi/h 70.4		70.4
Flow in Lanes 1 and 2 (v12), pc/h		2019	Ramp Junction Speed (S), mi/h		66.0
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2409	Average Density (D), pc/mi/ln		19.1
Level of Service (LOS)		С	Density in Ramp Influence Area (D	DR), pc/mi/ln	20.1

	HCS7 Basic F	reeway Report			
Project Information					
Analyst	CDM Smith	Date	2/8/2023		
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	Build PM Peak		
Project Description	SR 520 on-ramp to Dallas Boulevard 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors			-		
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	3490	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1261		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	72.8		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.3		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freeway	Diverge Repo <u>rt</u>			HCS7 Freeway Diverge Report					
Project Information											
Analyst	CDM Smit	า	Date		2/8/2023						
Agency	CDM Smit	า	Analysis Year		2030						
Jurisdiction	Orange Co	unty	Time Analyzed		Build PM P	eak					
Project Description	SR 520 on- Boulevard	ramp to Dallas off-ramp	Units		U.S. Custor	mary					
Geometric Data											
			Freeway		Ramp						
Number of Lanes (N), In			3		1						
Free-Flow Speed (FFS), mi/h			75.0		45.0						
Segment Length (L) / Deceleration	Length (LA)	ft	1500		230						
Terrain Type			Level		Level						
Percent Grade, %			-		-						
Segment Type / Ramp Type			Freeway		Right-Side	d One-Lane					
Adjustment Factors											
Driver Population			All Familiar		All Familiar						
Weather Type			Non-Severe Weather		Non-Severe Weather						
Incident Type			No Incident		-						
Final Speed Adjustment Factor (SAI	F)		0.980		0.980						
Final Capacity Adjustment Factor (C	CAF)		0.980		0.980						
Demand Adjustment Factor (DAF)			1.000		1.000						
Demand and Capacity			-								
Demand Volume (Vi)			3490	490 180							
Peak Hour Factor (PHF)			0.95		0.95						
Total Trucks, %			3.00		3.00						
Single-Unit Trucks (SUT), %			-		-						
Tractor-Trailers (TT), %			-		-						
Heavy Vehicle Adjustment Factor (f	HV)		0.971		0.971						
Flow Rate (vi),pc/h			3783		195						
Capacity (c), pc/h			7056		2058						
Volume-to-Capacity Ratio (v/c)			0.54		0.09						
Speed and Density			-								
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes	on Freeway	/ (No)	1					
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (DS)			0.327					
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1234		1234						
Distance to Downstream Ramp (LD	OWN), ft	2519	Off-Ramp Influence Area Speed (SR), mi/h 63		63.2						
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.656	Outer Lanes Freeway Spe	eed (SO), m	ni/h	79.7					
Flow in Lanes 1 and 2 (v12), pc/h		2549	Ramp Junction Speed (S), mi/h			67.8					
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/I	mi/ln		18.6					
Level of Service (LOS)		С	Density in Ramp Influence	ce Area (Dr	R), pc/mi/ln	24.1					
C	51.1.5				_						

	HCS7 Basic Fr	reeway Report			
Project Information					
Analyst	CDM Smith	Date	2/8/2023		
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	Build PM Peak		
Project Description	Dallas Boulevard off-ramp to 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	3310	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1196		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	73.1		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	16.4		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freeway	y Merge Report		
Project Information					
Analyst	CDM Smitl	h	Date	2/13/2023	
Agency	CDM Smitl	h	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM F	Peak
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary
Geometric Data				·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	825	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	r
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type		No Incident	-		
Final Speed Adjustment Factor (SA	=)		0.980	0.980	
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			3310	260	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			3588	282	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.55	0.14	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	1098.8	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	2519	Speed Index (Ms)		0.293
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1432		1432
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h 64.3		64.3
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.601	Outer Lanes Freeway Speed (SO),	mi/h	70.1
Flow in Lanes 1 and 2 (v12), pc/h		2156	Ramp Junction Speed (S), mi/h 66.3		66.3
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	2438	Average Density (D), pc/mi/ln		19.5
Level of Service (LOS)		В	Density in Ramp Influence Area (DR), pc/mi/ln	19.3

	HCS7 Basic Fi	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/13/2023
Agency	CDM Smith	Analysis Year	2030
Jurisdiction	Orange County	Time Analyzed	Build PM Peak
Project Description	Dallas Boulevard on-ramp to Innovation Way 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors	-		
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity	-		
Demand Volume veh/h	3570	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1290
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	72.6
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	В
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	2/13/2023	
Agency	CDM Smit	h	Analysis Year	2030	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM F	Peak
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custon	mary
Geometric Data				<u> </u>	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	270	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	r
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			3570	70 110	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			3870	119	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.55	0.06	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (DS)		0.320
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 1283		1283
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	63.4
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.658	Outer Lanes Freeway Speed (SO),	mi/h	79.5
Flow in Lanes 1 and 2 (v12), pc/h		2587	Ramp Junction Speed (S), mi/h		68.0
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		19.0
Level of Service (LOS)		С	Density in Ramp Influence Area (I	DR), pc/mi/ln	24.1

HCS7 Basic Freeway Report Project Information					
Agency	CDM Smith	Analysis Year	2030		
Jurisdiction	Orange County	Time Analyzed	Build PM Peak		
Project Description	Downstream of Innovation Way 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity	-		-		
Demand Volume veh/h	3460	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1250		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.53		
Passenger Car Equivalent (ET)	2.00				
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	72.9		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	17.1		
Total Ramp Density Adjustment	-	Level of Service (LOS)	В		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				
Lane Width Adjustment (fLW) Right-Side Lateral Clearance Adj. (fRLC) Total Ramp Density Adjustment	-	Density (D), pc/mi/ln	17.1		

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HCS7 Basic Freeway Report Project Information					
CDM Smith	Analysis Year	2050			
Orange County	Time Analyzed	Build AM Peak			
Upstream of Innovation Way on-ramp	Units	U.S. Customary			
3	Terrain Type	Level			
-	Percent Grade, %	-			
Measured	Grade Length, mi	-			
-	Total Ramp Density (TRD), ramps/mi	-			
-	Free-Flow Speed (FFS), mi/h	75.0			
-					
Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980			
Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980			
No Incident	Demand Adjustment Factor (DAF)	1.000			
-		•			
5080	Heavy Vehicle Adjustment Factor (fHV)	0.971			
0.95	Flow Rate (Vp), pc/h/ln	1836			
3.00	Capacity (c), pc/h/ln	2400			
-	Adjusted Capacity (cadj), pc/h/ln	2352			
-	Volume-to-Capacity Ratio (v/c)	0.78			
2.00					
-	Average Speed (S), mi/h	65.5			
-	Density (D), pc/mi/ln	28.0			
-	Level of Service (LOS)	D			
73.5					
	CDM Smith CDM Smith Orange County Upstream of Innovation Way on-ramp 3	CDM Smith Date CDM Smith Analysis Year Orange County Time Analyzed Upstream of Innovation Way on-ramp 3 Terrain Type - Percent Grade, % Measured Grade Length, mi - Total Ramp Density (TRD), ramps/mi - Free-Flow Speed (FFS), mi/h - Free-Flow Speed Adjustment Factor (SAF) Non-Severe Weather Final Capacity Adjustment Factor (CAF) No Incident Demand Adjustment Factor (fhv) 0.95 Flow Rate (Vp), pc/h/ln 3.00 Capacity (c), pc/h/ln - Adjusted Capacity Ratio (v/c) 2.00 - Average Speed (S), mi/h - Density (D), pc/mi/ln - Level of Service (LOS)			

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HCS7 Freeway Merge Report						
Project Information						
Analyst	CDM Smit	h	Date	2/8/2023		
Agency	CDM Smit	h	Analysis Year	2050		
Jurisdiction	Orange Co	ounty	Time Analyzed	Build AM F	Peak	
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Acceleration	Length (LA),	ft	1500	908		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population		All Familiar	All Familiar			
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type			No Incident	-		
Final Speed Adjustment Factor (SA	F)		0.980	0.980		
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			5080	170		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-	-		
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			5507	184		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)			0.81	0.09		
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms)		0.371	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 2186		2186	
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h 61.8		61.8	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.603	Outer Lanes Freeway Speed (SO),	mi/h	67.4	
Flow in Lanes 1 and 2 (v12), pc/h		3321	Ramp Junction Speed (S), mi/h		63.8	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	3505	Average Density (D), pc/mi/ln		29.7	
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 27.1		27.1	

HCS7 Basic Freeway Report					
Project Information					
Analyst	CDM Smith	Date	2/8/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	Innovation Way on-ramp to Dallas Boulevard 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	5250	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _P), pc/h/ln	1897		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.81		
Passenger Car Equivalent (ET)	2.00				
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	64.3		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	29.5		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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HCS7 Freeway Diverge Report					
Project Information					
Analyst	CDM Smit	h	Date	2/8/2023	
Agency	CDM Smit	h	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build AM F	Peak
Project Description		Nay on-ramp to levard off-ramp	Units	U.S. Custo	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	825	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population		All Familiar	All Familia		
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type		No Incident	-		
Final Speed Adjustment Factor (SAF	-)		0.980	0.980	
Final Capacity Adjustment Factor (C	AF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			5250	390	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			5691	423	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.81	0.21	
Speed and Density					
Upstream Equilibrium Distance (LEC)), ft	-	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP), t	t	-	Speed Index (Ds)		0.348
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	Flow Outer Lanes (vOA), pc/h/ln 2118	
Distance to Downstream Ramp (LDG	OWN), ft	2519	Off-Ramp Influence Area Speed (SR), mi/h 62.5		62.5
Prop. Freeway Vehicles in Lane 1 an	d 2 (PFD)	0.598	Outer Lanes Freeway Speed (SO),	mi/h	76.3
Flow in Lanes 1 and 2 (v12), pc/h		3573	Ramp Junction Speed (S), mi/h		67.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln		28.3
Level of Service (LOS)		С	Density in Ramp Influence Area (DR), pc/mi/ln 27.6		27.6

	HCS7 Basic Fr	eeway Report			
Project Information					
Analyst	CDM Smith	Date	2/13/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	Dallas Boulevard off-ramp to 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors	-				
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	4860	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1756		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	67.0		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	26.2		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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	HCS7 Freeway Merge Report					
Project Information				_		
Analyst	CDM Smit	h	Date		2/13/2023	
Agency	CDM Smit	n	Analysis Year		2050	
Jurisdiction	Orange Co	unty	Time Analyzed		Build AM F	Peak
Project Description	Dallas Bou 520 off-rar	levard on-ramp to SR mp	Units		U.S. Custor	mary
Geometric Data						
			Freeway		Ramp	
Number of Lanes (N), In			3		1	
Free-Flow Speed (FFS), mi/h			75.0		45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500		390	
Terrain Type			Level		Level	
Percent Grade, %			-		-	
Segment Type / Ramp Type			Freeway		Right-Side	d One-Lane
Adjustment Factors						
Driver Population			All Familiar		All Familiar	
Weather Type			Non-Severe Weather		Non-Severe Weather	
Incident Type			No Incident		-	
Final Speed Adjustment Factor (SA	F)		0.980		0.980	
Final Capacity Adjustment Factor (0	CAF)		0.980		0.980	
Demand Adjustment Factor (DAF)			1.000		1.000	
Demand and Capacity						
Demand Volume (Vi)			4860		330	
Peak Hour Factor (PHF)			0.95		0.95	
Total Trucks, %			3.00		3.00	
Single-Unit Trucks (SUT), %			-		-	
Tractor-Trailers (TT), %			-		-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971		0.971	
Flow Rate (vi),pc/h			5269		358	
Capacity (c), pc/h			7056		2058	
Volume-to-Capacity Ratio (v/c)			0.80		0.17	
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	1281.7	Number of Outer Lanes of	on Freeway	y (No)	1
Distance to Upstream Ramp (LUP),	ft	2519	Speed Index (MS)			0.410
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 2171		2171	
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h 60.6		60.6	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.588	Outer Lanes Freeway Spe	ed (SO), m	ni/h	67.5
Flow in Lanes 1 and 2 (v12), pc/h		3098	Ramp Junction Speed (S)	, mi/h		63.1
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	3456	Average Density (D), pc/r	mi/ln		29.7
Level of Service (LOS)		D	Density in Ramp Influenc	e Area (DF	R), pc/mi/ln	29.9
S 11.00000111 1: (51.11.411						

HCS7 Basic Freeway Report Project Information					
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	Dallas Boulevard on-ramp to SR 520 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	5190	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1875		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	64.7		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	29.0		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freeway	Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date	2/13/2023		
Agency	CDM Smit	h	Analysis Year	2050		
Jurisdiction	Orange Co	ounty	Time Analyzed	Build AM F	Peak	
Project Description	Dallas Bou 520 off-rai	levard on-ramp to SR mp	Units	U.S. Custo	mary	
Geometric Data			·			
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	240		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population		All Familiar	All Familiar	•		
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type		No Incident	-			
Final Speed Adjustment Factor (SAI	=)		0.980	0.980		
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)			1.000	1.000		
Demand and Capacity						
Demand Volume (Vi)			5190	820		
Peak Hour Factor (PHF)			0.95	0.95		
Total Trucks, %			3.00	3.00	3.00	
Single-Unit Trucks (SUT), %			-			
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			5626	889		
Capacity (c), pc/h			7056	2058		
Volume-to-Capacity Ratio (v/c)			0.80	0.43		
Speed and Density						
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1	
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.390	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 199		1999	
Distance to Downstream Ramp (LD	OWN), ft	2091	Off-Ramp Influence Area Speed (SR), mi/h 6		61.2	
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.578	Outer Lanes Freeway Speed (SO),	mi/h	76.7	
Flow in Lanes 1 and 2 (v12), pc/h		3627	Ramp Junction Speed (S), mi/h		65.9	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		28.5	
Level of Service (LOS)		D	Density in Ramp Influence Area (DR), pc/mi/ln 33.3		33.3	

HCS7 Basic Freeway Report Project Information					
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	SR 520 off-ramp to 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors	-				
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	4370	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1579		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	69.7		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	22.7		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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Geometric Data	ry of SR 520 on-ramp	Date Analysis Year Time Analyzed Units	2/13/2023 2050 Build AM P	
Agency CDM Smith Jurisdiction Orange County Project Description Downstream o Geometric Data	-	Analysis Year Time Analyzed	2050	
Jurisdiction Orange County Project Description Downstream o Geometric Data	-	Time Analyzed		
Project Description Downstream o Geometric Data	-	·	Build AM P	
Geometric Data	of SR 520 on-ramp	Units		'eak
		Offics	U.S. Custor	nary
		Freeway	Ramp	
Number of Lanes (N), In		3	1	
Free-Flow Speed (FFS), mi/h		75.0	45.0	
Segment Length (L) / Acceleration Length (LA),ft		1500	390	
Terrain Type		Level	Level	
Percent Grade, %		-	-	
Segment Type / Ramp Type		Freeway	Right-Sided	d One-Lane
Adjustment Factors				
Driver Population		All Familiar	All Familiar	
Weather Type		Non-Severe Weather	Non-Severe Weather	
Incident Type		No Incident	-	
Final Speed Adjustment Factor (SAF)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)		1.000	1.000	
Demand and Capacity				
Demand Volume (Vi)		4370	340	
Peak Hour Factor (PHF)		0.95	0.95	
Total Trucks, %		3.00	3.00	
Single-Unit Trucks (SUT), %		-	-	
Tractor-Trailers (TT), %		-	-	
Heavy Vehicle Adjustment Factor (fHV)		0.971	0.971	
Flow Rate (vi),pc/h		4737	369	
Capacity (c), pc/h		7056	2058	
Volume-to-Capacity Ratio (v/c)		0.72	0.18	
Speed and Density				
Upstream Equilibrium Distance (LEQ), ft 11	70.2	Number of Outer Lanes on Freeway	y (No)	1
Distance to Upstream Ramp (LUP), ft 209	91	Speed Index (MS)		0.378
Downstream Equilibrium Distance (LEQ), ft -		Flow Outer Lanes (vOA), pc/h/ln 1952		1952
Distance to Downstream Ramp (LDOWN), ft -		On-Ramp Influence Area Speed (SR), mi/h 61.6		61.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.5	588	Outer Lanes Freeway Speed (SO), m	ni/h	68.3
Flow in Lanes 1 and 2 (v12), pc/h	'85	Ramp Junction Speed (S), mi/h		64.0
Flow Entering Ramp-Infl. Area (vR12), pc/h 31!	54	Average Density (D), pc/mi/ln		26.6
Level of Service (LOS)		Density in Ramp Influence Area (Dr	R), pc/mi/ln	27.5

	HCS7 Basic F	reeway Report			
Project Information					
Analyst	CDM Smith	Date	2/13/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	Downstream of SR 520 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	4710	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1702		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	67.9		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	25.1		
Total Ramp Density Adjustment	-	Level of Service (LOS)	С		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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HCS7 Basic Freeway Report					
Project Information					
Analyst	CDM Smith	Date	2/8/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	Upstream of SR 520 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity	-		-		
Demand Volume veh/h	5290	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1912		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.81		
Passenger Car Equivalent (ET)	2.00				
Speed and Density					
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	64.0		
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	73.5				
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Project Information Analyst CDM Smith Agency CDM Smith Jurisdiction Orange County Project Description Upstream of SR 520 off-ramp Geometric Data Number of Lanes (N), In Free-Flow Speed (FFS), mi/h Segment Length (L) / Deceleration Length (LA),ft Terrain Type Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Andjustment Factor (DAF) Demand And Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	Date Analysis Year Time Analyzed Units Freeway 3 75.0 1500 Level - Freeway All Familiar Non-Severe Weather No Incident 0.980 0.980 1.000	2/8/2023 2050 Build AM P U.S. Custon Ramp 1 45.0 230 Level - Right-Sided All Familiar Non-Severe - 0.980 0.980	d One-Lane	
Agency CDM Smith Jurisdiction Orange County Project Description Upstream of SR 520 off-ramp Geometric Data Number of Lanes (N), In Free-Flow Speed (FFS), mi/h Segment Length (L) / Deceleration Length (LA),ft Terrain Type Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand Adjustment Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	Analysis Year Time Analyzed Units Freeway 3 75.0 1500 Level - Freeway All Familiar Non-Severe Weather No Incident 0.980 0.980	2050 Build AM P U.S. Custon Ramp 1 45.0 230 Level - Right-Sideo All Familiar Non-Severe - 0.980	d One-Lane	
Jurisdiction Orange County Project Description Upstream of SR 520 off-ramp Geometric Data Number of Lanes (N), In Free-Flow Speed (FFS), mi/h Segment Length (L) / Deceleration Length (LA),ft Terrain Type Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand And Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	Time Analyzed Units Freeway 3 75.0 1500 Level - Freeway All Familiar Non-Severe Weather No Incident 0.980 0.980	Ramp 1 45.0 230 Level - Right-Sideo All Familiar Non-Severe - 0.980	d One-Lane	
Project Description Geometric Data Number of Lanes (N), In Free-Flow Speed (FFS), mi/h Segment Length (L) / Deceleration Length (LA),ft Terrain Type Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	Units Freeway 3 75.0 1500 Level - Freeway All Familiar Non-Severe Weather No Incident 0.980 0.980	Ramp 1 45.0 230 Level - Right-Sideo All Familiar Non-Severe - 0.980	d One-Lane	
Reometric Data Number of Lanes (N), In Free-Flow Speed (FFS), mi/h Segment Length (L) / Deceleration Length (LA),ft Terrain Type Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	Freeway 3 75.0 1500 Level - Freeway All Familiar Non-Severe Weather No Incident 0.980 0.980	Ramp 1 45.0 230 Level - Right-Sideo All Familiar Non-Severe - 0.980	d One-Lane	
Number of Lanes (N), In Free-Flow Speed (FFS), mi/h Segment Length (L) / Deceleration Length (LA),ft Terrain Type Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	3 75.0 1500 Level - Freeway All Familiar Non-Severe Weather No Incident 0.980 0.980	1 45.0 230 Level - Right-Sideo All Familiar Non-Severe - 0.980		
Free-Flow Speed (FFS), mi/h Segment Length (L) / Deceleration Length (LA),ft Terrain Type Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	3 75.0 1500 Level - Freeway All Familiar Non-Severe Weather No Incident 0.980 0.980	1 45.0 230 Level - Right-Sideo All Familiar Non-Severe - 0.980		
Free-Flow Speed (FFS), mi/h Segment Length (L) / Deceleration Length (LA),ft Terrain Type Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	75.0 1500 Level - Freeway All Familiar Non-Severe Weather No Incident 0.980 0.980	45.0 230 Level - Right-Sideo All Familiar Non-Severe - 0.980		
Segment Length (L) / Deceleration Length (LA),ft Terrain Type Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	1500 Level - Freeway All Familiar Non-Severe Weather No Incident 0.980 0.980	230 Level - Right-Sideo All Familiar Non-Severe - 0.980		
Terrain Type Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand And Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	Level - Freeway All Familiar Non-Severe Weather No Incident 0.980 0.980	Level - Right-Sideo All Familiar Non-Severe - 0.980		
Percent Grade, % Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	- Freeway All Familiar Non-Severe Weather No Incident 0.980 0.980	All Familiar Non-Severe - 0.980		
Segment Type / Ramp Type Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	All Familiar Non-Severe Weather No Incident 0.980 0.980	All Familiar Non-Severe		
Adjustment Factors Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	All Familiar Non-Severe Weather No Incident 0.980 0.980	All Familiar Non-Severe		
Driver Population Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	Non-Severe Weather No Incident 0.980 0.980	Non-Severe	e Weather	
Weather Type Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	Non-Severe Weather No Incident 0.980 0.980	Non-Severe	e Weather	
Incident Type Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	No Incident 0.980 0.980	0.980	e Weather	
Final Speed Adjustment Factor (SAF) Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	0.980 0.980			
Final Capacity Adjustment Factor (CAF) Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	0.980			
Demand Adjustment Factor (DAF) Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density		0.980	0.980	
Demand and Capacity Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	1.000	0.980		
Demand Volume (Vi) Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density		1.000		
Peak Hour Factor (PHF) Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density				
Total Trucks, % Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	5290	180		
Single-Unit Trucks (SUT), % Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	0.95	0.95		
Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	3.00	3.00		
Heavy Vehicle Adjustment Factor (fHV) Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	-	-		
Flow Rate (vi),pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	-	-		
Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) Speed and Density	0.971	0.971		
Volume-to-Capacity Ratio (v/c) Speed and Density	5735	195		
Speed and Density	7056	2058		
	0.81	0.09		
Upstream Equilibrium Distance (LEQ), ft	Number of Outer Lanes on Freewa	y (No)	1	
Distance to Upstream Ramp (LUP), ft -	Speed Index (DS)		0.327	
Downstream Equilibrium Distance (LEQ), ft -	Flow Outer Lanes (vOA), pc/h/ln		2172	
Distance to Downstream Ramp (LDOWN), ft 2091	Tiow outer Lanes (VOA), pe/ii/iii	Off-Ramp Influence Area Speed (SR), mi/h 63.		
Prop. Freeway Vehicles in Lane 1 and 2 (PFD) 0.608	·	R), mi/h		
Flow in Lanes 1 and 2 (v12), pc/h 3563	·		76.1	
Flow Entering Ramp-Infl. Area (vR12), pc/h	Off-Ramp Influence Area Speed (S		76.1 67.5	
Level of Service (LOS) D	Off-Ramp Influence Area Speed (SO), I			

HCS7 Basic Freeway Report Project Information					
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	SR 520 off-ramp to 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	5110	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1847		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	65.3		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	28.3		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freeway	y Merge Report		
Project Information					
Analyst	CDM Smitl	n	Date	2/8/2023	
Agency	CDM Smitl	n	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build AM F	Peak
Project Description	SR 520 on- Boulevard	ramp to Dallas off-ramp	Units	U.S. Custo	mary
Geometric Data					
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	640	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familiar	
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type		No Incident	-		
Final Speed Adjustment Factor (SAF)		0.980	0.980		
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)	mand Adjustment Factor (DAF) 1.0		1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)		5110	520		
Peak Hour Factor (PHF)		0.95	0.95		
Total Trucks, %		3.00	3.00		
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			5540	564	
Capacity (c), pc/h		7056	2058		
Volume-to-Capacity Ratio (v/c)			0.87	0.27	
Speed and Density					
Upstream Equilibrium Distance (LEC	Q), ft	1494.7	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	2091	Speed Index (Ms)		0.450
Downstream Equilibrium Distance ((LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 2		2244
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (S	SR), mi/h	59.3
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.595	Outer Lanes Freeway Speed (SO),	mi/h	67.2
Flow in Lanes 1 and 2 (v12), pc/h		3296	Ramp Junction Speed (S), mi/h		62.0
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	3860	Average Density (D), pc/mi/ln		32.8
Level of Service (LOS)		D	Density in Ramp Influence Area (D	PR), pc/mi/ln	31.4

HCS7 Basic Freeway Report					
Project Information					
Analyst	CDM Smith	Date	2/8/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	SR 520 on-ramp to Dallas Boulevard 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity	-				
Demand Volume veh/h	5630	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	2034		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	61.2		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	33.2		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freewa	y Diverge Report			
Project Information						
Analyst	CDM Smit	h	Date	2/8/2023		
Agency	CDM Smit	h	Analysis Year	2050		
Jurisdiction	Orange Co	ounty	Time Analyzed	Build AM F	Peak	
Project Description	SR 520 on Boulevard	-ramp to Dallas off-ramp	Units	U.S. Custo	mary	
Geometric Data						
			Freeway	Ramp		
Number of Lanes (N), In			3	1		
Free-Flow Speed (FFS), mi/h			75.0	45.0		
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	230		
Terrain Type			Level	Level		
Percent Grade, %			-	-		
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane	
Adjustment Factors						
Driver Population			All Familiar	All Familia	r	
Weather Type			Non-Severe Weather	Non-Sever	e Weather	
Incident Type		No Incident	-			
Final Speed Adjustment Factor (SAF)		0.980	0.980			
Final Capacity Adjustment Factor (CAF)		0.980	0.980			
Demand Adjustment Factor (DAF)	nd Adjustment Factor (DAF) 1.000 1.000					
Demand and Capacity						
Demand Volume (Vi)		5630	160			
Peak Hour Factor (PHF)		0.95	0.95			
Total Trucks, %		3.00	3.00			
Single-Unit Trucks (SUT), %			-	-	-	
Tractor-Trailers (TT), %			-	-		
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971		
Flow Rate (vi),pc/h			6103	173		
Capacity (c), pc/h		7056	2058			
Volume-to-Capacity Ratio (v/c)		0.86	0.08			
Speed and Density						
Upstream Equilibrium Distance (LEC	ι), ft	-	Number of Outer Lanes on Free	way (No)	1	
Distance to Upstream Ramp (LUP), t	ft	-	Speed Index (Ds)		0.325	
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	Flow Outer Lanes (vOA), pc/h/ln 2		
Distance to Downstream Ramp (LDG	OWN), ft	2519	Off-Ramp Influence Area Speed	(SR), mi/h	63.3	
Prop. Freeway Vehicles in Lane 1 an	d 2 (PFD)	0.599	Outer Lanes Freeway Speed (SO), mi/h	75.3	
Flow in Lanes 1 and 2 (v12), pc/h		3725	Ramp Junction Speed (S), mi/h		67.5	
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	-	Average Density (D), pc/mi/ln		30.1	
Level of Service (LOS)		D	Density in Ramp Influence Area	Density in Ramp Influence Area (DR), pc/mi/ln 34.2		

HCS7 Basic Freeway Report Project Information					
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	Dallas Boulevard off-ramp to 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors			-		
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	5470	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1977		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	62.5		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	31.6		
Total Ramp Density Adjustment	-	Level of Service (LOS)	D		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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		HCS7 Freeway	y Merge Report		
Project Information					
Analyst	CDM Smit	h	Date	2/13/2023	
Agency	CDM Smit	h	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build AM F	Peak
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary
Geometric Data				·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	825	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population		All Familiar	All Familia	•	
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type		No Incident	-		
Final Speed Adjustment Factor (SAF)			0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)	emand Adjustment Factor (DAF)		1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)		5470	900		
Peak Hour Factor (PHF)		0.95	0.95		
Total Trucks, %		3.00	3.00		
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			5930	976	
Capacity (c), pc/h		7056	2058		
Volume-to-Capacity Ratio (v/c)		0.98	0.47		
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	1748.5	Number of Outer Lanes on Freev	vay (No)	1
Distance to Upstream Ramp (LUP),	ft	2519	Speed Index (Ms)		0.614
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 2:		2366
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed ((SR), mi/h	54.2
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.601	Outer Lanes Freeway Speed (SO),	mi/h	66.6
Flow in Lanes 1 and 2 (v12), pc/h		3564	Ramp Junction Speed (S), mi/h		57.9
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	4540	Average Density (D), pc/mi/ln		39.8
Level of Service (LOS)		E	Density in Ramp Influence Area (DR), pc/mi/ln 35.3		35.3

HCS7 Basic Freeway Report				
Project Information				
Analyst	CDM Smith	Date	2/13/2023	
Agency	CDM Smith	Analysis Year	2050	
Jurisdiction	Orange County	Time Analyzed	Build AM Peak	
Project Description	Dallas Boulevard on-ramp to Innovation Way 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	75.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980	
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980	
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000	
Demand and Capacity	-			
Demand Volume veh/h	6370	Heavy Vehicle Adjustment Factor (fHV)	0.971	
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2302	
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352	
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	53.8	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	42.8	
Total Ramp Density Adjustment	-	Level of Service (LOS)	E	
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5			

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		HCS7 Freeway	Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	2/13/2023	
Agency	CDM Smit	h	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build AM F	Peak
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary
Geometric Data				·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	ft	1500	270	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	•
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type		No Incident	-		
Final Speed Adjustment Factor (SAF)			0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980		
Demand Adjustment Factor (DAF)	nand Adjustment Factor (DAF) 1.000		1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)		6370	220		
Peak Hour Factor (PHF)		0.95	0.95		
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			6906	238	
Capacity (c), pc/h		7056	2058		
Volume-to-Capacity Ratio (v/c)		0.98	0.12		
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Free	way (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)		0.331
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		2700
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed	(SR), mi/h	63.1
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.576	Outer Lanes Freeway Speed (SO)	, mi/h	74.0
Flow in Lanes 1 and 2 (v12), pc/h		4206	Ramp Junction Speed (S), mi/h		67.0
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		34.4
Level of Service (LOS)		Е	Density in Ramp Influence Area (DR), pc/mi/ln 38.0		38.0

	HCS7 Basic Fr	eeway Report			
Project Information					
Analyst	CDM Smith	Date	2/13/2023		
Agency	CDM Smith	Analysis Year	2050		
Jurisdiction	Orange County	Time Analyzed	Build AM Peak		
Project Description	Downstream of Innovation Way 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	75.0		
Right-Side Lateral Clearance, ft	-				
Adjustment Factors					
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980		
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980		
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000		
Demand and Capacity					
Demand Volume veh/h	6150	Heavy Vehicle Adjustment Factor (fHV)	0.971		
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	2222		
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352		
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	56.2		
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	39.5		
Total Ramp Density Adjustment	-	Level of Service (LOS)	Е		
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5				

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	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/8/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	Build PM Peak
Project Description	Upstream of Innovation Way 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6070	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	2193
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.93
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	57.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	38.5
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freewa	y Merge Report		
Project Information					
Analyst	CDM Smit	n	Date	2/8/2023	
Agency	CDM Smit	า	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM F	Peak
Project Description		Way on-ramp to levard off-ramp	Units	U.S. Custo	mary
Geometric Data				·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	908	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors			·		
Driver Population			All Familiar	All Familia	r
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			6070	220	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			6580	238	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.97	0.12	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ms)		0.503
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 26		2612
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	57.7
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.603	Outer Lanes Freeway Speed (So), mi/h 65.1		65.1
Flow in Lanes 1 and 2 (v12), pc/h		3968	Ramp Junction Speed (S), mi/h 60.3		60.3
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	4206	Average Density (D), pc/mi/ln		37.7
Level of Service (LOS)		D	Density in Ramp Influence Area (DR), pc/mi/ln 32.6		

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/8/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	Build PM Peak
Project Description	Innovation Way on-ramp to Dallas Boulevard 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	6290	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	2273
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.97
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	54.7
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	41.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	E
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	/ Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	2/8/2023	
Agency	CDM Smit	h	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM F	Peak
Project Description		Nay on-ramp to levard off-ramp	Units	U.S. Custo	mary
Geometric Data	•			·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	825	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	r
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			6290	820	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			6819	889	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.97	0.43	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freev	vay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (Ds)	Speed Index (Ds)	
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		2674
Distance to Downstream Ramp (LD	OWN), ft	2519	Off-Ramp Influence Area Speed	(SR), mi/h	61.2
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.549	Outer Lanes Freeway Speed (SO)	Outer Lanes Freeway Speed (SO), mi/h 74	
Flow in Lanes 1 and 2 (v12), pc/h		4145	Ramp Junction Speed (S), mi/h 65.7		65.7
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		34.6
Level of Service (LOS)		D	Density in Ramp Influence Area ((DR), pc/mi/ln	32.5

	HCS7 Basic Fr	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/13/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	Build PM Peak
Project Description	Dallas Boulevard off-ramp to 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5470	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1977
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	62.5
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	31.6
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Merge Report		
Project Information					
Analyst	CDM Smitl	า	Date	2/13/2023	
Agency	CDM Smitl	า	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM F	Peak
Project Description	Dallas Bou 520 off-rar	levard on-ramp to SR mp	Units	U.S. Custo	mary
Geometric Data				·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Acceleration	Length (LA),	ft	1500	390	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	=)		0.980	0.980	
Final Capacity Adjustment Factor (0	CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			5470	160	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			5930	173	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.86	0.08	
Speed and Density					
Upstream Equilibrium Distance (LEG	Ω), ft	1383.5	Number of Outer Lanes on Free	way (No)	1
Distance to Upstream Ramp (LUP),	ft	2519	Speed Index (MS)		0.438
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln 2-		2443
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h		59.7
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.588	Outer Lanes Freeway Speed (SO), mi/h 66.1		66.1
Flow in Lanes 1 and 2 (v12), pc/h		3487	Ramp Junction Speed (S), mi/h 62.1		62.1
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	3660	Average Density (D), pc/mi/ln		32.8
Level of Service (LOS)		D	Density in Ramp Influence Area	(DR), pc/mi/ln	31.6

	HCS7 Basic Fr	eeway Report	
Project Information			
Analyst	CDM Smith	Date	2/13/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	Build PM Peak
Project Description	Dallas Boulevard on-ramp to SR 520 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			-
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5630	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	2034
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
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	61.2
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	33.2
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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		HCS7 Freeway	Diverge Report		
Project Information					
Analyst	CDM Smit	h	Date	2/13/2023	
Agency	CDM Smit	h	Analysis Year	2050	
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM F	Peak
Project Description	Dallas Bou 520 off-rai	llevard on-ramp to SR mp	Units	U.S. Custo	mary
Geometric Data	•		·	·	
			Freeway	Ramp	
Number of Lanes (N), In			3	1	
Free-Flow Speed (FFS), mi/h			75.0	45.0	
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	240	
Terrain Type			Level	Level	
Percent Grade, %			-	-	
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane
Adjustment Factors					
Driver Population			All Familiar	All Familia	•
Weather Type			Non-Severe Weather	Non-Sever	e Weather
Incident Type			No Incident	-	
Final Speed Adjustment Factor (SA	F)		0.980	0.980	
Final Capacity Adjustment Factor (CAF)		0.980	0.980	
Demand Adjustment Factor (DAF)			1.000	1.000	
Demand and Capacity					
Demand Volume (Vi)			5630	820	
Peak Hour Factor (PHF)			0.95	0.95	
Total Trucks, %			3.00	3.00	
Single-Unit Trucks (SUT), %			-	-	
Tractor-Trailers (TT), %			-	-	
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971	
Flow Rate (vi),pc/h			6103	889	
Capacity (c), pc/h			7056	2058	
Volume-to-Capacity Ratio (v/c)			0.86	0.43	
Speed and Density					
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freev	vay (No)	1
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (DS)		0.390
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		2258
Distance to Downstream Ramp (LD	OWN), ft	2091	Off-Ramp Influence Area Speed	(SR), mi/h	61.2
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.567	Outer Lanes Freeway Speed (SO), mi/h 7		75.7
Flow in Lanes 1 and 2 (v12), pc/h		3845	Ramp Junction Speed (S), mi/h 65.9		65.9
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		30.9
Level of Service (LOS)		E	Density in Ramp Influence Area (DR), pc/mi/ln 35.2		

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/13/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	Build PM Peak
Project Description	SR 520 off-ramp to 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors	-		
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	4810	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1738
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.74
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	67.3
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	25.8
Total Ramp Density Adjustment	-	Level of Service (LOS)	С
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

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Analyst CDM Smith Date 2/13/2023 Agency CDM Smith Analysis Year 2050 Jurisdiction Orange County Time Analyzed Build PM Peak Project Description Downstream of SR 520 on-ramp Units U.S. Customary Geometric Data Free-Flow Speed (FFS), mi/h Free-Flow Speed (FFS), mi/h Segment Length (L) / Acceleration Length (LA).ft 1500 390 Terrain Type Level Level Level Percent Grade, % Segment Type / Ramp Type Freeway Right Sided One-Lane Adjustment Factors Driver Population Martin Martin Martin Mon-Severe Weather Non-Severe Weather Incident Type Non-Severe Weather Non-Severe Weather Non-Severe Weather Incident Type Final Speed Adjustment Factor (CAF) 0,980 0,980 Permand Adjustment Factor (CAF) 0,990 0,980 Demand Adjustment Factor (PHF) 4810 180 Peak Hour Factor (PHF) 0,95 0,95 Total Trucks (SUT), % Tractor-Trailers (TT), % Heavy Wehicle Adjustment Factor (HtV) Flow Rate (vi), pc/h Flow Capacity Ratio (v/c) Free Ranalyzed Build PM Peak Build PM P			HCS7 Freeway	Merge Report				
Agency CDM Smith Analysis Year 2050 Durisdiction Orange County Time Analyzed Build PM Peak	Project Information							
Jurisdiction Orange County Time Analyzed Build PM Peak Project Description Downstream of SR \$20 on-ramp Units U.S. Customary Geometric Data Freeway Ramp Number of Lanes (N), In 3 1 Free-Flow Speed (FFS), mi/h 75.0 45.0 Segment Length (L) / Acceleration Length (LA)ft 1500 390 Terrain Type Level Level Percent Grade, % - - Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Wearher Type All Familiar All Familiar Non-Severe Weather Non-Severe Weather Incident Type Non-Severe Weather Non-Severe Weather Final Capacity Adjustment Factor (CAF) 0,980 0,980 Demand Adjustment Factor (CAF) 0,980 0,980 Demand Adjustment Factor (FAF) 0,980 0,980 Demand Adjustment Factor (CAF) 0,980 0,980 Deman	Analyst	CDM Smith	า	Date	2/1	13/2023		
Project Description	Agency	CDM Smith	1	Analysis Year	205	50		
Freeway Ramp Number of Lanes (N), in 3 1	Jurisdiction	Orange Co	unty	Time Analyzed	Bui	ild PM Pe	eak	
Freeway Ramp Number of Lanes (N), In 3 1	Project Description	Downstrea	m of SR 520 on-ramp	Units	U.S	S. Custon	nary	
Number of Lanes (N), In Free-Flow Speed (FFS), mi/h Freerin Type Level Level Level Level Freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar Mather Type Non-Severe Weather Non-Severe Weath	Geometric Data							
Free-Flow Speed (FFS), mi/h Segment Length (L) / Acceleration Length (LA),ft 1500 380 Terrain Type Level Level Level Percent Grade, % Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Driver Population Meather Type Non-Severe Weather Non-Severe W				Freeway	Rar	mp		
Segment Length (L) / Acceleration Length (LA),ft 1500 390 Terrain Type Level Level Percent Grade, % - - Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Speed Adjustment Factor (CAF) 0.980 0.980 Demand Adjustment Factor (CAF) 0.990 0.980 Demand Adjustment Factor (CAF) 0.990 0.950 Demand Capacity Demand Capacity Demand Capacity Demand Capacity <td colspan<="" td=""><td>Number of Lanes (N), In</td><td></td><td></td><td>3</td><td>1</td><td></td><td></td></td>	<td>Number of Lanes (N), In</td> <td></td> <td></td> <td>3</td> <td>1</td> <td></td> <td></td>	Number of Lanes (N), In			3	1		
Terrain Type	Free-Flow Speed (FFS), mi/h			75.0	45.	.0		
Percent Grade, % Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar Weather Type Non-Severe Weather Non-Severe Weather Non-Severe Weather Incident Type No Incident	Segment Length (L) / Acceleration L	ength (LA),	ft	1500	390	0		
Segment Type / Ramp Type Freeway Right-Sided One-Lane Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (DAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Adjustment Factor (DAF) 4810 180 Demand Volume (Vi) 4810 180 Demand Volume (Vi) 4810 180 Demand Volume (Vi) 4810 180 Description (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 3.00 Single-Unit Trucks (SUT), % - - - Tractor-Trailers (TT), % - - - Leave Male (Majust	Terrain Type			Level	Lev	/el		
Adjustment Factors Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (DAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Capacity Demand Volume (V) 4810 180 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, SUT), % 3.00 3.00 Tractor-Trailers (TT), % - -	Percent Grade, %			-	-			
Driver Population All Familiar All Familiar Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (DAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Capacity Demand and Capacity 4810 180 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (Hrv) 0.971 0.971 Flow Rate (vi), pc/h 5214 195 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.77 0.09 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1235.0 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUD), ft 2091 Speed Index (Ms)	Segment Type / Ramp Type			Freeway	Rig	ht-Sideo	d One-Lane	
Weather Type Non-Severe Weather Non-Severe Weather Incident Type No Incident - Final Speed Adjustment Factor (SAF) 0.980 0.980 Final Capacity Adjustment Factor (DAF) 0.980 0.980 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Adjustment Factor (DAF) 1.000 1.000 Demand Capacity Demand Wolume (VI) 4810 180 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - - Tractor-Trailers (TT), % - - - Freewy Vehicle Adjustment Factor (HvV) 0.971 0.971 Flow Rate (vI),pc/h 5214 195 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.77 0.09 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1235.0 Number of Outer Lanes on Freeway (NO) 1	Adjustment Factors							
No Incident Type	Driver Population			All Familiar	All	Familiar		
Final Speed Adjustment Factor (SAF) 0.980	Weather Type			Non-Severe Weather	No	Non-Severe Weather		
Final Capacity Adjustment Factor (CAF) 0.980 0.980 0.980	Incident Type			No Incident	-	-		
Demand Adjustment Factor (DAF) 1,000 1,000 Demand and Capacity Demand Volume (Vi) 4810 180 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (vi),pc/h 5214 195 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.77 0.09 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1235.0 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LuP), ft 2091 Speed Index (MS) 0.388 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/n 2148 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/	Final Speed Adjustment Factor (SAF)		0.980	0.9	80		
Demand and Capacity Demand Volume (Vi) 4810 180 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHV) 0.971 0.971 Flow Rate (wi),pc/h 5214 195 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.77 0.09 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1235.0 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2091 Speed Index (Ms) 0.388 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 2148 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.3 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.6 Flow in Lanes 1 and 2 (v12), pc/h 3066 Ramp Junction Speed (S), mi/h	Final Capacity Adjustment Factor (C	AF)		0.980	0.9	80		
Demand Volume (Vi) 4810 180 Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHv) 0.971 0.971 Flow Rate (wi),pc/h 5214 195 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.77 0.09 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1235.0 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2091 Speed Index (Ms) 0.388 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/In 2148 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.3 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.6 Flow in Lanes 1 and 2 (v12), pc/h 3066 Ramp Junction Speed (S), mi/h 63.7 Flow Entering Ramp-Infl. Area (vR12), pc/h 3261 Average Density (D), pc/mi/ln	Demand Adjustment Factor (DAF)			1.000	1.0	000		
Peak Hour Factor (PHF) 0.95 0.95 Total Trucks, % 3.00 3.00 Single-Unit Trucks (SUT), % - - Tractor-Trailers (TT), % - - Heavy Vehicle Adjustment Factor (fHV) 0.971 0.971 Flow Rate (vi),pc/h 5214 195 Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 0.77 0.09 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1235.0 Number of Outer Lanes on Freeway (No) 1 Distance to Upstream Ramp (LUP), ft 2091 Speed Index (MS) 0.388 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 2148 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.3 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.6 Flow in Lanes 1 and 2 (v12), pc/h 3066 Ramp Junction Speed (S), mi/h 63.7 Flow Entering Ramp-Infl. Area (vR12), pc/h 3261 Average Density (D), pc/mi/ln	Demand and Capacity							
Total Trucks, % 3.00 3.00	Demand Volume (Vi)			4810	180	0		
Single-Unit Trucks (SUT), % - - - - - - - - -	Peak Hour Factor (PHF)			0.95	0.9	0.95		
Tractor-Trailers (TT), % Heavy Vehicle Adjustment Factor (fHV) 0.971 0.971 195 Capacity (c), pc/h Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) 7056 2058 Volume-to-Capacity Ratio (v/c) 7056 0.77 0.09 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1235.0 Number of Outer Lanes on Freeway (NO) Distance to Upstream Ramp (LUP), ft 2091 Speed Index (MS) Downstream Equilibrium Distance (LEQ), ft Flow Outer Lanes (vOA), pc/h/ln 2148 Distance to Downstream Ramp (LDOWN), ft On-Ramp Influence Area Speed (SR), mi/h 61.3 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) Flow in Lanes 1 and 2 (v12), pc/h 3066 Ramp Junction Speed (S), mi/h 63.7 Flow Entering Ramp-Infl. Area (vR12), pc/h 3261 Average Density (D), pc/mi/ln 28.3	Total Trucks, %			3.00	3.0	3.00		
Heavy Vehicle Adjustment Factor (fHv) Flow Rate (vi),pc/h Capacity (c), pc/h Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 7056 O.77 O.09 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1235.0 Number of Outer Lanes on Freeway (NO) Distance to Upstream Ramp (LUP), ft 2091 Speed Index (MS) Downstream Equilibrium Distance (LEQ), ft Flow Outer Lanes (vOA), pc/h/ln Distance to Downstream Ramp (LDOWN), ft On-Ramp Influence Area Speed (SR), mi/h Flow In Lanes 1 and 2 (v12), pc/h Ramp Junction Speed (S), mi/h Flow Entering Ramp-Infl. Area (vR12), pc/h 3261 Average Density (D), pc/mi/ln 28.3	Single-Unit Trucks (SUT), %			-	-	-		
Flow Rate (vi),pc/h Capacity (c), pc/h 7056 2058 Volume-to-Capacity Ratio (v/c) 7056 0.77 0.09 Speed and Density Upstream Equilibrium Distance (LEQ), ft 1235.0 Number of Outer Lanes on Freeway (No) Distance to Upstream Ramp (LUP), ft 2091 Speed Index (MS) Downstream Equilibrium Distance (LEQ), ft Flow Outer Lanes (vOA), pc/h/ln 2148 Distance to Downstream Ramp (LDOWN), ft On-Ramp Influence Area Speed (SR), mi/h 61.3 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) Flow in Lanes 1 and 2 (v12), pc/h 3066 Ramp Junction Speed (S), mi/h 63.7 Flow Entering Ramp-Infl. Area (vR12), pc/h 3261 Average Density (D), pc/mi/ln 228.3	Tractor-Trailers (TT), %			-	-	-		
Capacity (c), pc/h Volume-to-Capacity Ratio (v/c) 5peed and Density Upstream Equilibrium Distance (LEQ), ft Distance to Upstream Equilibrium Distance (LEQ), ft Downstream Equilibrium Distance (LEQ), ft On-Ramp Influence Area Speed (SR), mi/h Flow Entering Ramp-Infl. Area (vR12), pc/h 7056 0.77 0.09 Number of Outer Lanes on Freeway No) 1 Speed Index (MS) 0.388 Flow Outer Lanes (vOA), pc/h/ln 2148 On-Ramp Influence Area Speed (SR), mi/h 67.6 Ramp Junction Speed (S), mi/h 63.7 Average Density (D), pc/mi/ln 28.3	Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.9	0.971		
Volume-to-Capacity Ratio (v/c) Speed and Density Upstream Equilibrium Distance (LEQ), ft 1235.0 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2091 Speed Index (MS) 0.388 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 2148 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.3 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.6 Flow in Lanes 1 and 2 (v12), pc/h 3066 Ramp Junction Speed (S), mi/h 63.7 Flow Entering Ramp-Infl. Area (vR12), pc/h 3261 Average Density (D), pc/mi/ln 28.3	Flow Rate (vi),pc/h			5214	195	195		
Speed and DensityUpstream Equilibrium Distance (LEQ), ft1235.0Number of Outer Lanes on Freeway (No)1Distance to Upstream Ramp (LUP), ft2091Speed Index (Ms)0.388Downstream Equilibrium Distance (LEQ), ft-Flow Outer Lanes (vOA), pc/h/ln2148Distance to Downstream Ramp (LDOWN), ft-On-Ramp Influence Area Speed (SR), mi/h61.3Prop. Freeway Vehicles in Lane 1 and 2 (PFM)0.588Outer Lanes Freeway Speed (SO), mi/h67.6Flow in Lanes 1 and 2 (v12), pc/h3066Ramp Junction Speed (S), mi/h63.7Flow Entering Ramp-Infl. Area (vR12), pc/h3261Average Density (D), pc/mi/ln28.3	Capacity (c), pc/h			7056	205	2058		
Upstream Equilibrium Distance (LEQ), ft 1235.0 Number of Outer Lanes on Freeway (NO) 1 Distance to Upstream Ramp (LUP), ft 2091 Speed Index (MS) 0.388 Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 2148 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.3 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.6 Flow in Lanes 1 and 2 (v12), pc/h 3066 Ramp Junction Speed (S), mi/h 63.7 Flow Entering Ramp-Infl. Area (vR12), pc/h 3261 Average Density (D), pc/mi/ln 28.3	Volume-to-Capacity Ratio (v/c)			0.77	0.0	19		
Distance to Upstream Ramp (LUP), ft 2091 Speed Index (Ms) Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 2148 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.3 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.6 Flow in Lanes 1 and 2 (v12), pc/h 3066 Ramp Junction Speed (S), mi/h 63.7 Flow Entering Ramp-Infl. Area (vR12), pc/h 3261 Average Density (D), pc/mi/ln 28.3	Speed and Density							
Downstream Equilibrium Distance (LEQ), ft - Flow Outer Lanes (vOA), pc/h/ln 2148 Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.3 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.6 Flow in Lanes 1 and 2 (v12), pc/h 3066 Ramp Junction Speed (S), mi/h 63.7 Flow Entering Ramp-Infl. Area (vR12), pc/h 3261 Average Density (D), pc/mi/ln 28.3	Upstream Equilibrium Distance (LEQ), ft	1235.0	Number of Outer Lanes of	on Freeway (N	O)	1	
Distance to Downstream Ramp (LDOWN), ft - On-Ramp Influence Area Speed (SR), mi/h 61.3 Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.6 Flow in Lanes 1 and 2 (v12), pc/h 3066 Ramp Junction Speed (S), mi/h 63.7 Flow Entering Ramp-Infl. Area (vR12), pc/h 3261 Average Density (D), pc/mi/ln 28.3	Distance to Upstream Ramp (LUP), f	t	2091	Speed Index (MS)			0.388	
Prop. Freeway Vehicles in Lane 1 and 2 (PFM) 0.588 Outer Lanes Freeway Speed (SO), mi/h 67.6 Flow in Lanes 1 and 2 (v12), pc/h 3066 Ramp Junction Speed (S), mi/h 63.7 Flow Entering Ramp-Infl. Area (vR12), pc/h 3261 Average Density (D), pc/mi/ln 28.3	Downstream Equilibrium Distance (I	LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		2148		
Flow in Lanes 1 and 2 (v12), pc/h Slow Entering Ramp-Infl. Area (vR12), pc/h	Distance to Downstream Ramp (LDC	OWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h		61.3		
Flow Entering Ramp-Infl. Area (vR12), pc/h 3261 Average Density (D), pc/mi/ln 28.3	Prop. Freeway Vehicles in Lane 1 an	d 2 (PFM)	0.588	Outer Lanes Freeway Speed (SO), mi/h 67.6		67.6		
	Flow in Lanes 1 and 2 (v12), pc/h		3066	Ramp Junction Speed (S), mi/h 63.7		63.7		
Level of Service (LOS) Density in Ramp Influence Area (DR), pc/mi/ln 28.4	Flow Entering Ramp-Infl. Area (vR12), pc/h	3261	Average Density (D), pc/r	mi/ln		28.3	
	Level of Service (LOS)		D	Density in Ramp Influence	e Area (DR), po	c/mi/ln	28.4	

	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/13/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	Build PM Peak
Project Description	Downstream of SR 520 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity	-		
Demand Volume veh/h	4990	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1803
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.77
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	66.1
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	73.5		

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	HCS7 Basic F	reeway Report	
Project Information			
Analyst	CDM Smith	Date	2/8/2023
Agency	CDM Smith	Analysis Year	2050
Jurisdiction	Orange County	Time Analyzed	Build PM Peak
Project Description	Upstream of SR 520 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	75.0
Right-Side Lateral Clearance, ft	-		
Adjustment Factors			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Demand Volume veh/h	5010	Heavy Vehicle Adjustment Factor (fHV)	0.971
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1810
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.77
Passenger Car Equivalent (ET)	2.00		
Speed and Density			
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	66.0
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	27.4
Total Ramp Density Adjustment	-	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5		

HCSTM Freeways Version 7.9.6 2050 PM WB_1.xuf

	HCS7 Freewa	y Diverge Report			
Project Information					
Analyst CI	DM Smith	Date	2/8/2023		
Agency CI	DM Smith	Analysis Year	2050		
Jurisdiction O	range County	Time Analyzed	Build PM F	Peak	
Project Description U	ostream of SR 520 off-ramp	Units	U.S. Custo	mary	
Geometric Data					
		Freeway	Ramp		
Number of Lanes (N), In		3	1		
Free-Flow Speed (FFS), mi/h		75.0	45.0		
Segment Length (L) / Deceleration Ler	ngth (LA),ft	1500	230		
Terrain Type		Level	Level		
Percent Grade, %		-	-		
Segment Type / Ramp Type		Freeway	Right-Side	d One-Lane	
Adjustment Factors					
Driver Population		All Familiar	All Familia	r	
Weather Type		Non-Severe Weather	Non-Sever	Non-Severe Weather	
Incident Type		No Incident	-		
Final Speed Adjustment Factor (SAF)		0.980	0.980		
Final Capacity Adjustment Factor (CAF	·)	0.980	0.980		
Demand Adjustment Factor (DAF)		1.000	1.000		
Demand and Capacity					
Demand Volume (Vi)		5010	340		
Peak Hour Factor (PHF)		0.95	0.95		
Total Trucks, %		3.00	3.00		
Single-Unit Trucks (SUT), %		-	-	-	
Tractor-Trailers (TT), %		-	-		
Heavy Vehicle Adjustment Factor (fHV)		0.971	0.971		
Flow Rate (vi),pc/h		5431	369		
Capacity (c), pc/h		7056	2058		
Volume-to-Capacity Ratio (v/c)		0.77	0.18		
Speed and Density					
Upstream Equilibrium Distance (LEQ), t	ft -	Number of Outer Lanes on Free	way (No)	1	
Distance to Upstream Ramp (LUP), ft	-	Speed Index (Ds)		0.343	
Downstream Equilibrium Distance (LEC	2), ft -	Flow Outer Lanes (vOA), pc/h/ln		1989	
Distance to Downstream Ramp (LDOW	N), ft 2091	Off-Ramp Influence Area Speed	(SR), mi/h	62.7	
Prop. Freeway Vehicles in Lane 1 and 2	2 (PFD) 0.607	Outer Lanes Freeway Speed (SO), mi/h 7		76.8	
Flow in Lanes 1 and 2 (v12), pc/h	3442	Ramp Junction Speed (S), mi/h 67		67.2	
Flow Entering Ramp-Infl. Area (vR12), p	oc/h -	Average Density (D), pc/mi/ln 26.9		26.9	
Level of Service (LOS)	D	Density in Ramp Influence Area	(DR), pc/mi/ln	31.8	

	HCS7 Basic F	reeway Report		
Project Information				
Analyst	CDM Smith	Date	2/8/2023	
Agency	CDM Smith	Analysis Year	2050	
Jurisdiction	Orange County	Time Analyzed	Build PM Peak	
Project Description	SR 520 off-ramp to 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	75.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980	
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980	
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000	
Demand and Capacity				
Demand Volume veh/h	4670	Heavy Vehicle Adjustment Factor (fHV)	0.971	
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1688	
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352	
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	68.1	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	24.8	
Total Ramp Density Adjustment	-	Level of Service (LOS)	С	
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5			

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		HCS7 Freewa	y Merge Report				
Project Information							
Analyst	CDM Smitl	า	Date	2/8/2023			
Agency	CDM Smitl	า	Analysis Year	2050			
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM P	eak		
Project Description	SR 520 on- Boulevard	ramp to Dallas off-ramp	Units	U.S. Custor	mary		
Geometric Data							
			Freeway	Ramp			
Number of Lanes (N), In			3	1			
Free-Flow Speed (FFS), mi/h			75.0	45.0			
Segment Length (L) / Acceleration	Length (LA),	ft	1500	640	640		
Terrain Type			Level	Level			
Percent Grade, %			-	-			
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane		
Adjustment Factors							
Driver Population			All Familiar				
Weather Type		Non-Severe Weather	Non-Sever	e Weather			
Incident Type		No Incident	-				
Final Speed Adjustment Factor (SAI		0.980	0.980				
Final Capacity Adjustment Factor (CAF)			0.980	0.980			
Demand Adjustment Factor (DAF)	emand Adjustment Factor (DAF)			1.000			
Demand and Capacity							
Demand Volume (Vi)			4670	520			
Peak Hour Factor (PHF)			0.95	0.95			
Total Trucks, %			3.00	3.00			
Single-Unit Trucks (SUT), %			-	-			
Tractor-Trailers (TT), %			-	-			
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971			
Flow Rate (vi),pc/h			5063	564			
Capacity (c), pc/h			7056	2058			
Volume-to-Capacity Ratio (v/c)			0.80	0.27			
Speed and Density							
Upstream Equilibrium Distance (LEC	Q), ft	1392.7	Number of Outer Lanes on Freewa	ay (No)	1		
Distance to Upstream Ramp (LUP),	ft	2091	Speed Index (MS)		0.404		
Downstream Equilibrium Distance ((LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		2051		
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (S	SR), mi/h	60.8		
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.595	Outer Lanes Freeway Speed (SO),	mi/h	67.9		
Flow in Lanes 1 and 2 (v12), pc/h		3012	Ramp Junction Speed (S), mi/h		63.2		
Flow Entering Ramp-Infl. Area (vR12	2), pc/h	3576	Average Density (D), pc/mi/ln		29.7		
Level of Service (LOS)		D	Density in Ramp Influence Area (D	PR), pc/mi/ln	29.2		

HCS7 Basic Freeway Report								
Project Information								
CDM Smith	Date	2/8/2023						
CDM Smith	Analysis Year	2050						
Orange County	Time Analyzed	Build PM Peak						
SR 520 on-ramp to Dallas Boulevard off-ramp	Units	U.S. Customary						
3	Terrain Type	Level						
-	Percent Grade, %	-						
Measured	Grade Length, mi	-						
-	Total Ramp Density (TRD), ramps/mi	-						
-	Free-Flow Speed (FFS), mi/h	75.0						
-								
Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980						
Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980						
No Incident	Demand Adjustment Factor (DAF)	1.000						
5190	Heavy Vehicle Adjustment Factor (fHV)	0.971						
0.95	Flow Rate (Vp), pc/h/ln	1875						
3.00	Capacity (c), pc/h/ln	2400						
-	Adjusted Capacity (cadj), pc/h/ln	2352						
-	Volume-to-Capacity Ratio (v/c)	0.80						
2.00								
-	Average Speed (S), mi/h	64.7						
-	Density (D), pc/mi/ln	29.0						
-	Level of Service (LOS)	D						
73.5								
	CDM Smith CDM Smith Orange County SR 520 on-ramp to Dallas Boulevard off-ramp 3 - Measured Mostly Familiar Non-Severe Weather No Incident 5190 0.95 3.00 2.00	CDM Smith Date CDM Smith Analysis Year Orange County Time Analyzed SR 520 on-ramp to Dallas Boulevard off-ramp 3 Terrain Type - Percent Grade, % Measured Grade Length, mi - Total Ramp Density (TRD), ramps/mi Free-Flow Speed (FFS), mi/h - Free-Flow Speed (FFS), mi/h Mostly Familiar Final Speed Adjustment Factor (SAF) Non-Severe Weather Final Capacity Adjustment Factor (CAF) No Incident Demand Adjustment Factor (DAF) 5190 Heavy Vehicle Adjustment Factor (FHV) 0.95 Flow Rate (Vp), pc/h/ln 3.00 Capacity (c), pc/h/ln - Adjusted Capacity (cadj), pc/h/ln - Volume-to-Capacity Ratio (v/c) 2.00 Average Speed (S), mi/h Density (D), pc/mi/ln - Level of Service (LOS)						

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		HCS7 Freewa	y Diverge Report				
Project Information							
Analyst	CDM Smit	h	Date	2/8/2023			
Agency	CDM Smit	h	Analysis Year	2050			
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM F	Peak		
Project Description	SR 520 on Boulevard	-ramp to Dallas off-ramp	Units	U.S. Custo	mary		
Geometric Data				·			
			Freeway	Ramp			
Number of Lanes (N), In			3	1			
Free-Flow Speed (FFS), mi/h			75.0	45.0			
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	230	230		
Terrain Type			Level	Level	Level		
Percent Grade, %			-	-			
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane		
Adjustment Factors			·				
Driver Population			All Familiar	r			
Weather Type		Non-Severe Weather	Non-Seve	re Weather			
Incident Type		No Incident	-				
Final Speed Adjustment Factor (SAF)			0.980	0.980			
Final Capacity Adjustment Factor (CAF)			0.980	0.980			
Demand Adjustment Factor (DAF)	Demand Adjustment Factor (DAF)			1.000			
Demand and Capacity							
Demand Volume (Vi)			5190	330			
Peak Hour Factor (PHF)			0.95	0.95			
Total Trucks, %			3.00	3.00			
Single-Unit Trucks (SUT), %			-	-			
Tractor-Trailers (TT), %			-	-			
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971			
Flow Rate (vi),pc/h			5626	358			
Capacity (c), pc/h			7056	2058			
Volume-to-Capacity Ratio (v/c)			0.80	0.17			
Speed and Density							
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on F	reeway (NO)	1		
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (DS)		0.342		
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h	/ln	2091		
Distance to Downstream Ramp (LD	OWN), ft	2519	Off-Ramp Influence Area Spe	eed (SR), mi/h	62.7		
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.603	Outer Lanes Freeway Speed	(SO), mi/h	76.4		
Flow in Lanes 1 and 2 (v12), pc/h		3535	Ramp Junction Speed (S), mi	/h	67.2		
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/li	n	27.9		
Level of Service (LOS)		D	Density in Ramp Influence A	rea (DR), pc/mi/ln	32.6		

	HCS7 Basic Fr	reeway Report				
Project Information						
Analyst	CDM Smith	Date	2/8/2023			
Agency	CDM Smith	Analysis Year	2050			
Jurisdiction	Orange County	Time Analyzed	Build PM Peak			
Project Description	Dallas Boulevard off-ramp to 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	75.0			
Right-Side Lateral Clearance, ft	-					
Adjustment Factors			-			
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980			
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980			
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000			
Demand and Capacity						
Demand Volume veh/h	4860	Heavy Vehicle Adjustment Factor (fHV)	0.971			
Peak Hour Factor	0.95	Flow Rate (Vp), pc/h/ln	1756			
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400			
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352			
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	67.0			
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	26.2			
Total Ramp Density Adjustment	-	Level of Service (LOS)	D			
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5					

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		HCS7 Freeway	/ Merge Report				
Project Information							
Analyst	CDM Smit	n	Date	2/13/2023			
Agency	CDM Smit	า	Analysis Year				
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM P	Peak		
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary		
Geometric Data	•						
			Freeway	Ramp			
Number of Lanes (N), In			3	1			
Free-Flow Speed (FFS), mi/h			75.0	45.0			
Segment Length (L) / Acceleration	Length (LA),	ft	1500	825	825		
Terrain Type			Level	Level			
Percent Grade, %			-	-			
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane		
Adjustment Factors							
Driver Population			All Familiar	•			
Weather Type		Non-Severe Weather	Non-Sever	e Weather			
Incident Type		No Incident	-				
Final Speed Adjustment Factor (SA		0.980	0.980				
Final Capacity Adjustment Factor (CAF)			0.980	0.980			
Demand Adjustment Factor (DAF)	emand Adjustment Factor (DAF)			1.000			
Demand and Capacity							
Demand Volume (Vi)			4860	390			
Peak Hour Factor (PHF)			0.95	0.95			
Total Trucks, %			3.00	3.00			
Single-Unit Trucks (SUT), %			-	-			
Tractor-Trailers (TT), %			-	-			
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971			
Flow Rate (vi),pc/h			5269	423			
Capacity (c), pc/h			7056	2058			
Volume-to-Capacity Ratio (v/c)			0.81	0.21			
Speed and Density							
Upstream Equilibrium Distance (LEG	Q), ft	1488.7	Number of Outer Lanes on Freew	ay (No)	1		
Distance to Upstream Ramp (LUP),	ft	2519	Speed Index (Ms)		0.390		
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		2102		
Distance to Downstream Ramp (LD	OWN), ft	-	On-Ramp Influence Area Speed (S	SR), mi/h	61.2		
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFM)	0.601	Outer Lanes Freeway Speed (SO),	mi/h	67.7		
Flow in Lanes 1 and 2 (v12), pc/h		3167	Ramp Junction Speed (S), mi/h		63.4		
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	3590	Average Density (D), pc/mi/ln		29.9		
Level of Service (LOS)		D	Density in Ramp Influence Area (I	DR), pc/mi/ln	28.2		

	HCS7 Basic Fi	reeway Report		
Project Information				
Analyst	CDM Smith	Date	2/13/2023	
Agency	CDM Smith	Analysis Year	2050	
Jurisdiction	Orange County	Time Analyzed	Build PM Peak	
Project Description	Dallas Boulevard on-ramp to Innovation Way 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	75.0	
Right-Side Lateral Clearance, ft	-			
Adjustment Factors				
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980	
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980	
Incident Type	No Incident	Demand Adjustment Factor (DAF)		
Demand and Capacity				
Demand Volume veh/h	5250	Heavy Vehicle Adjustment Factor (fHV)	0.971	
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1897	
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400	
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352	
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.81	
Passenger Car Equivalent (ET)	2.00			
Speed and Density				
Lane Width Adjustment (fLW)	-	Average Speed (S), mi/h	64.3	
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	29.5	
Total Ramp Density Adjustment	-	Level of Service (LOS)	D	
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5			

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		HCS7 Freeway	Diverge Report				
Project Information							
Analyst	CDM Smit	h	Date	2/13/2023			
Agency	CDM Smit	h	Analysis Year	2050			
Jurisdiction	Orange Co	ounty	Time Analyzed	Build PM P	Peak		
Project Description		levard on-ramp to Way off-ramp	Units	U.S. Custo	mary		
Geometric Data				<u> </u>			
			Freeway	Ramp			
Number of Lanes (N), In			3	1			
Free-Flow Speed (FFS), mi/h			75.0	45.0	45.0		
Segment Length (L) / Deceleration	Length (LA)	,ft	1500	270	270		
Terrain Type			Level	Level			
Percent Grade, %			-	-			
Segment Type / Ramp Type			Freeway	Right-Side	d One-Lane		
Adjustment Factors							
Driver Population			All Familiar	All Familiar	•		
Weather Type		Non-Severe Weather	Non-Sever	e Weather			
Incident Type			No Incident	-			
Final Speed Adjustment Factor (SA	F)		0.980	0.980			
Final Capacity Adjustment Factor (CAF)			0.980	0.980			
Demand Adjustment Factor (DAF)	Pemand Adjustment Factor (DAF)			1.000			
Demand and Capacity							
Demand Volume (Vi)			5250	170			
Peak Hour Factor (PHF)			0.95	0.95			
Total Trucks, %			3.00	3.00			
Single-Unit Trucks (SUT), %			-	-			
Tractor-Trailers (TT), %			-	-			
Heavy Vehicle Adjustment Factor (f	HV)		0.971	0.971			
Flow Rate (vi),pc/h			5691	184			
Capacity (c), pc/h			7056	2058			
Volume-to-Capacity Ratio (v/c)			0.81	0.09			
Speed and Density							
Upstream Equilibrium Distance (LEG	Q), ft	-	Number of Outer Lanes on Freew	ay (No)	1		
Distance to Upstream Ramp (LUP),	ft	-	Speed Index (DS)		0.326		
Downstream Equilibrium Distance	(LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln		2153		
Distance to Downstream Ramp (LD	OWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	63.2		
Prop. Freeway Vehicles in Lane 1 ar	nd 2 (PFD)	0.609	Outer Lanes Freeway Speed (SO),	mi/h	76.1		
Flow in Lanes 1 and 2 (v12), pc/h		3538	Ramp Junction Speed (S), mi/h		67.5		
Flow Entering Ramp-Infl. Area (vR1)	2), pc/h	-	Average Density (D), pc/mi/ln		28.1		
Level of Service (LOS)		D	Density in Ramp Influence Area (I	DR), pc/mi/ln	32.2		

HCS7 Basic Freeway Report								
Project Information								
Analyst	CDM Smith	Date	2/13/2023					
Agency	CDM Smith	Analysis Year	2050					
Jurisdiction	Orange County	Time Analyzed	Build PM Peak					
Project Description	Downstream of Innovation Way 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	75.0					
Right-Side Lateral Clearance, ft	-							
Adjustment Factors								
Driver Population	Mostly Familiar	Final Speed Adjustment Factor (SAF)	0.980					
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.980					
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000					
Demand and Capacity								
Demand Volume veh/h	5080	Heavy Vehicle Adjustment Factor (fнv)	0.971					
Peak Hour Factor	0.95	Flow Rate (V _p), pc/h/ln	1836					
Total Trucks, %	3.00	Capacity (c), pc/h/ln	2400					
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	2352					
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	65.5					
Right-Side Lateral Clearance Adj. (fRLC)	-	Density (D), pc/mi/ln	28.0					
Total Ramp Density Adjustment	-	Level of Service (LOS)	D					
Adjusted Free-Flow Speed (FFSadj), mi/h	73.5							
Total Ramp Density Adjustment	73.5							

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Lane Group EBL EBR NBL NBT SBT SBR Lane Configurations 1		•	•	•	†	↓	4
Traffic Volume (vph) 120 140 0 260 290 0 Future Volume (vph) 120 140 0 260 290 0 Satd. Flow (prot) 1770 1583 0 1863 1863 0 Flt Permitted 0.950 0.950 0.85 0 1863 1863 0 Confl. Peds. (#/hr) 0.95	Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Future Volume (vph) 120 140 0 260 290 0 Satd. Flow (prot) 1770 1583 0 1863 1863 0 Flt Permitted 0.950 0	Lane Configurations	*	7		†	†	
Satd. Flow (prot) 1770 1583 0 1863 1863 0 Flt Permitted 0.950	Traffic Volume (vph)	120	140	0	260	290	0
Flt Permitted 0.950 Satd. Flow (perm) 1770 1583 0 1863 1863 0 Confl. Peds. (#/hr) Confl. Bikes (#/hr) Peak Hour Factor 0.95 <td>Future Volume (vph)</td> <td>120</td> <td>140</td> <td>0</td> <td>260</td> <td>290</td> <td>0</td>	Future Volume (vph)	120	140	0	260	290	0
Satd. Flow (perm) 1770 1583 0 1863 1863 0 Confl. Peds. (#/hr) Confl. Bikes (#/hr) Peak Hour Factor 0.95	Satd. Flow (prot)	1770	1583	0	1863	1863	0
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% 2% Bus Blockages (#/hr) 0 0 0 0 0 0 0 Parking (#/hr) Mid-Block Traffic (%) Shared Lane Traffic (%) Lane Group Flow (vph) 126 147 0 274 305 0	Flt Permitted	0.950					
Confl. Bikes (#/hr) Peak Hour Factor 0.95 0.96 0.96 0.96 0.96 0.96 0.96 Shared Lane Traffic (%) 0.96 <t< td=""><td>Satd. Flow (perm)</td><td>1770</td><td>1583</td><td>0</td><td>1863</td><td>1863</td><td>0</td></t<>	Satd. Flow (perm)	1770	1583	0	1863	1863	0
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) Wid-Block Traffic (%) 0% 0% 0% 0% Shared Lane Traffic (%) Lane Group Flow (vph) 126 147 0 274 305 0	Confl. Peds. (#/hr)						
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) Wid-Block Traffic (%) 0% 0% 0% 0% 0% Shared Lane Traffic (%) Lane Group Flow (vph) 126 147 0 274 305 0	Confl. Bikes (#/hr)						
Heavy Vehicles (%) 2% 2% 2% 2% 2% 2% 2% 2% Bus Blockages (#/hr) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Bus Blockages (#/hr) 0 0 0 0 0 0 0 Parking (#/hr) Mid-Block Traffic (%) 0% 0% 0% Shared Lane Traffic (%) Lane Group Flow (vph) 126 147 0 274 305 0	Growth Factor	100%	100%	100%	100%	100%	100%
Parking (#/hr) Mid-Block Traffic (%) 0% 0% Shared Lane Traffic (%) Lane Group Flow (vph) 126 147 0 274 305 0		2%	2%	2%	2%	2%	2%
Mid-Block Traffic (%) 0% 0% Shared Lane Traffic (%) Lane Group Flow (vph) 126 147 0 274 305 0	Bus Blockages (#/hr)	0	0	0	0	0	0
Shared Lane Traffic (%) Lane Group Flow (vph) 126 147 0 274 305 0	Parking (#/hr)						
Lane Group Flow (vph) 126 147 0 274 305 0	Mid-Block Traffic (%)	0%			0%	0%	
Sign Control Stop Free Free	Lane Group Flow (vph)	126	147	0	274	305	0
	Sign Control	Stop			Free	Free	
Intersection Summary	Intersection Summary						

Control Type: Unsignalized Intersection Capacity Utilization 30.6%

ICU Level of Service A

Analysis Period (min) 15

Lane Group EBL EBR NBL NBT SBT SBR Lane Configurations 4 1
Traffic Volume (vph) 0 0 170 210 290 500 Future Volume (vph) 0 0 170 210 290 500 Satd. Flow (prot) 0 0 0 1822 1704 0 Flt Permitted 0.978 Satd. Flow (perm) 0 0 1822 1704 0 Confl. Peds. (#/hr) Confl. Bikes (#/hr)
Future Volume (vph) 0 0 170 210 290 500 Satd. Flow (prot) 0 0 0 1822 1704 0 Flt Permitted 0.978 Satd. Flow (perm) 0 0 0 1822 1704 0 Confl. Peds. (#/hr)
Satd. Flow (prot) 0 0 1822 1704 0 Fit Permitted 0.978 Satd. Flow (perm) 0 0 1822 1704 0 Confl. Peds. (#/hr) Confl. Bikes (#/hr)
Fit Permitted 0.978 Satd. Flow (perm) 0 0 1822 1704 0 Confl. Peds. (#/hr) Confl. Bikes (#/hr)
Satd. Flow (perm) 0 0 0 1822 1704 0 Confl. Peds. (#/hr) Confl. Bikes (#/hr)
Confl. Peds. (#/hr) Confl. Bikes (#/hr)
Confl. Bikes (#/hr)
, ,
Peak Hour Factor 0.95 0.95 0.95 0.95 0.95
1 Call 1 Total 1 actor 0.70 0.70 0.70 0.70 0.70
Growth Factor 100% 100% 100% 100% 100% 100%
Heavy Vehicles (%) 2% 2% 2% 2% 2% 2%
Bus Blockages (#/hr) 0 0 0 0 0
Parking (#/hr)
Mid-Block Traffic (%) 0% 0%
Shared Lane Traffic (%)
Lane Group Flow (vph) 0 0 0 400 831 0
Sign Control Stop Free Free
Intersection Summary

Control Type: Unsignalized Intersection Capacity Utilization 73.1%

ICU Level of Service D

Analysis Period (min) 15

	۶	→	•	•	←	•	4	†	/	\	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	10	10	20	210	10	10	10	100	100	10	560	10
Future Volume (vph)	10	10	20	210	10	10	10	100	100	10	560	10
Satd. Flow (prot)	0	1717	0	0	1772	0	0	1740	0	0	1857	0
Flt Permitted		0.987			0.957			0.998			0.999	
Satd. Flow (perm)	0	1717	0	0	1772	0	0	1740	0	0	1857	0
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%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	0	0	243	0	0	221	0	0	611	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Control Type: Unsignalized Intersection Capacity Utilization 59.5%

ICU Level of Service B

Analysis Period (min) 15

Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	6:30	6:30	6:30	6:30	6:30	6:30	6:30
End Time	9:00	9:00	9:00	9:00	9:00	9:00	9:00
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	2743	2825	2747	2665	2747	2765	2813
Vehs Exited	2749	2833	2741	2667	2765	2757	2829
Starting Vehs	39	41	27	36	53	29	42
Ending Vehs	33	33	33	34	35	37	26
Travel Distance (mi)	1969	2032	1975	1910	1974	1978	2029
Travel Time (hr)	68.1	69.8	67.2	65.6	67.8	68.0	70.4
Total Delay (hr)	14.3	14.6	13.4	13.4	13.8	14.2	15.1
Total Stops	2758	2841	2713	2607	2720	2764	2838
Fuel Used (gal)	79.9	82.8	80.1	78.0	80.2	80.2	83.0

Summary of All Intervals

Run Number	8	9	10	Avg	
Start Time	6:30	6:30	6:30	6:30	
End Time	9:00	9:00	9:00	9:00	
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	2799	2738	2831	2767	
Vehs Exited	2818	2735	2825	2772	
Starting Vehs	45	36	34	36	
Ending Vehs	26	39	40	32	
Travel Distance (mi)	2016	1967	2026	1988	
Travel Time (hr)	70.0	67.6	69.8	68.4	
Total Delay (hr)	14.7	13.8	14.6	14.2	
Total Stops	2765	2751	2797	2755	
Fuel Used (gal)	82.1	80.4	81.9	80.9	

Interval #0 Information Seeding

Start Time	6:30
End Time	7:00
Total Time (min)	30
Volumes adjusted by Grow	wth Factors.
No data recorded this inter	rval.

Interval #1	Information	Recording
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Start Time	7:00		
End Time	9:00		
Total Time (min)	120		
Volumes adjusted by Grov	wth Factors.		

Run Number	1	2	3	4	5	6	7
Vehs Entered	2743	2825	2747	2665	2747	2765	2813
Vehs Exited	2749	2833	2741	2667	2765	2757	2829
Starting Vehs	39	41	27	36	53	29	42
Ending Vehs	33	33	33	34	35	37	26
Travel Distance (mi)	1969	2032	1975	1910	1974	1978	2029
Travel Time (hr)	68.1	69.8	67.2	65.6	67.8	68.0	70.4
Total Delay (hr)	14.3	14.6	13.4	13.4	13.8	14.2	15.1
Total Stops	2758	2841	2713	2607	2720	2764	2838
Fuel Used (gal)	79.9	82.8	80.1	78.0	80.2	80.2	83.0

Interval #1 Information Recording

Start Time	7:00		
End Time	9:00		
Total Time (min)	120		
Volumes adjusted by Grov	wth Factors.		

Run Number	8	9	10	Avg	
Vehs Entered	2799	2738	2831	2767	
Vehs Exited	2818	2735	2825	2772	
Starting Vehs	45	36	34	36	
Ending Vehs	26	39	40	32	
Travel Distance (mi)	2016	1967	2026	1988	
Travel Time (hr)	70.0	67.6	69.8	68.4	
Total Delay (hr)	14.7	13.8	14.6	14.2	
Total Stops	2765	2751	2797	2755	
Fuel Used (gal)	82.1	80.4	81.9	80.9	

Intersection: 1: SR 528 EB Ramps & Dallas Boulevard

Movement	EB	EB
Directions Served	L	R
Maximum Queue (ft)	85	47
Average Queue (ft)	37	2
95th Queue (ft)	64	18
Link Distance (ft)	1607	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		720
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Dallas Boulevard & SR 528 WB Ramps

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (ft)	176	20
Average Queue (ft)	58	1
95th Queue (ft)	118	8
Link Distance (ft)	569	253
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Starry Street & Dallas Boulevard

EB	WB	NB	SB
LTR	LTR	LTR	LTR
54	103	96	252
24	53	45	102
48	83	71	174
972	978	253	1246
	LTR 54 24 48	LTR LTR 54 103 24 53 48 83	LTR LTR LTR 54 103 96 24 53 45 48 83 71

Zone Summary

Zone wide Queuing Penalty: 0

	۶	•	4	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	*	7		†	†	
Traffic Volume (vph)	400	160	0	210	120	0
Future Volume (vph)	400	160	0	210	120	0
Satd. Flow (prot)	1770	1583	0	1863	1863	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	1583	0	1863	1863	0
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%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	421	168	0	221	126	0
Sign Control	Stop			Free	Free	
Intersection Summary						

Control Type: Unsignalized Intersection Capacity Utilization 39.9%

ICU Level of Service A

Analysis Period (min) 15

	۶	•	4	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				4	f)	
Traffic Volume (vph)	0	0	70	540	120	190
Future Volume (vph)	0	0	70	540	120	190
Satd. Flow (prot)	0	0	0	1852	1708	0
Flt Permitted				0.994		
Satd. Flow (perm)	0	0	0	1852	1708	0
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%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	642	326	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Openhard Transcriberalisms of the selection of the select						

Control Type: Unsignalized Intersection Capacity Utilization 56.9%

ICU Level of Service B

Analysis Period (min) 15

	•	→	\rightarrow	•	←	•	4	†	/	>	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	10	10	20	90	10	10	20	330	190	10	200	10
Future Volume (vph)	10	10	20	90	10	10	20	330	190	10	200	10
Satd. Flow (prot)	0	1717	0	0	1767	0	0	1770	0	0	1848	0
Flt Permitted		0.987			0.961			0.998			0.998	
Satd. Flow (perm)	0	1717	0	0	1767	0	0	1770	0	0	1848	0
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%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	0	0	117	0	0	568	0	0	233	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Control Type: Unsignalized Intersection Capacity Utilization 55.8%

Analysis Period (min) 15

ICU Level of Service B

Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	4:30	4:30	4:30	4:30	4:30	4:30	4:30
End Time	7:00	7:00	7:00	7:00	7:00	7:00	7:00
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	2244	2322	2231	2304	2268	2302	2294
Vehs Exited	2236	2324	2233	2301	2258	2299	2291
Starting Vehs	24	28	28	26	19	21	25
Ending Vehs	32	26	26	29	29	24	28
Travel Distance (mi)	1667	1732	1650	1715	1691	1711	1710
Travel Time (hr)	55.1	57.7	54.1	57.1	56.4	56.2	56.4
Total Delay (hr)	10.7	11.8	10.2	11.6	11.4	10.7	11.1
Total Stops	2656	2759	2628	2741	2699	2689	2690
Fuel Used (gal)	62.7	65.3	62.4	64.5	63.8	64.2	64.4

Summary of All Intervals

Run Number	8	9	10	Avg	
Start Time	4:30	4:30	4:30	4:30	
End Time	7:00	7:00	7:00	7:00	
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	2285	2317	2391	2295	
Vehs Exited	2266	2328	2392	2294	
Starting Vehs	27	35	23	23	
Ending Vehs	46	24	22	26	
Travel Distance (mi)	1690	1728	1777	1707	
Travel Time (hr)	56.6	57.5	58.9	56.6	
Total Delay (hr)	11.6	11.6	11.9	11.3	
Total Stops	2753	2792	2824	2722	
Fuel Used (gal)	63.4	65.4	66.7	64.3	

Interval #0 Information Seeding

Start Time	4:30
End Time	5:00
Total Time (min)	30
Volumes adjusted by Grow	th Factors.
No data recorded this inter-	val.

Interval #1	Information	Recording
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Start Time	5:00	
End Time	7:00	
Total Time (min)	120	
Volumes adjusted by Gro	wth Factors.	

Run Number	1	2	3	4	5	6	7
Vehs Entered	2244	2322	2231	2304	2268	2302	2294
Vehs Exited	2236	2324	2233	2301	2258	2299	2291
Starting Vehs	24	28	28	26	19	21	25
Ending Vehs	32	26	26	29	29	24	28
Travel Distance (mi)	1667	1732	1650	1715	1691	1711	1710
Travel Time (hr)	55.1	57.7	54.1	57.1	56.4	56.2	56.4
Total Delay (hr)	10.7	11.8	10.2	11.6	11.4	10.7	11.1
Total Stops	2656	2759	2628	2741	2699	2689	2690
Fuel Used (gal)	62.7	65.3	62.4	64.5	63.8	64.2	64.4

Interval #1 Information Recording

Start Time	5:00	
End Time	7:00	
Total Time (min)	120	
Volumes adjusted by	y Growth Factors.	

Run Number	8	9	10	Avg	
Vehs Entered	2285	2317	2391	2295	
Vehs Exited	2266	2328	2392	2294	
Starting Vehs	27	35	23	23	
Ending Vehs	46	24	22	26	
Travel Distance (mi)	1690	1728	1777	1707	
Travel Time (hr)	56.6	57.5	58.9	56.6	
Total Delay (hr)	11.6	11.6	11.9	11.3	
Total Stops	2753	2792	2824	2722	
Fuel Used (gal)	63.4	65.4	66.7	64.3	

Intersection: 1: SR 528 EB Ramps & Dallas Boulevard

Movement	EB	EB
Directions Served	L	R
Maximum Queue (ft)	217	44
Average Queue (ft)	85	1
95th Queue (ft)	150	15
Link Distance (ft)	1607	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		720
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Dallas Boulevard & SR 528 WB Ramps

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (ft)	100	3
Average Queue (ft)	13	0
95th Queue (ft)	51	2
Link Distance (ft)	569	253
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Starry Street & Dallas Boulevard

EB	WB	NB	SB
LTR	LTR	LTR	LTR
52	72	102	92
23	36	59	45
47	56	85	70
972	978	253	1246
	LTR 52 23 47	LTR LTR 52 72 23 36 47 56	LTR LTR LTR 52 72 102 23 36 59 47 56 85

Zone Summary

Zone wide Queuing Penalty: 0

	۶	•	•	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Ť	7			+	
Traffic Volume (vph)	150	240	0	510	540	0
Future Volume (vph)	150	240	0	510	540	0
Satd. Flow (prot)	1770	1583	0	1863	1863	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	1583	0	1863	1863	0
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%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	158	253	0	537	568	0
Sign Control	Stop			Free	Free	
Intersection Summary						

Control Type: Unsignalized Intersection Capacity Utilization 49.9%

ICU Level of Service A

Analysis Period (min) 15

	۶	\rightarrow	•	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				4	f)	
Traffic Volume (vph)	0	0	270	390	540	630
Future Volume (vph)	0	0	270	390	540	630
Satd. Flow (prot)	0	0	0	1825	1727	0
Flt Permitted				0.980		
Satd. Flow (perm)	0	0	0	1825	1727	0
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%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	695	1231	0
Sign Control	Stop			Free	Free	
Intersection Summary						

Intersection Summary

Control Type: Unsignalized Intersection Capacity Utilization 109.1%

ICU Level of Service H

Analysis Period (min) 15

	•	-	•	•	•	•	4	†	/	-	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	20	20	30	380	20	20	30	160	200	20	760	20
Future Volume (vph)	20	20	30	380	20	20	30	160	200	20	760	20
Satd. Flow (prot)	0	1730	0	0	1772	0	0	1727	0	0	1855	0
Flt Permitted		0.986			0.957			0.996			0.999	
Satd. Flow (perm)	0	1730	0	0	1772	0	0	1727	0	0	1855	0
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%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	74	0	0	442	0	0	411	0	0	842	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Control Type: Unsignalized Intersection Capacity Utilization 82.9%

ICU Level of Service E

Analysis Period (min) 15

Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	6:30	6:30	6:30	6:30	6:30	6:30	6:30
End Time	9:00	9:00	9:00	9:00	9:00	9:00	9:00
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	4052	4134	4091	4104	4035	4079	4142
Vehs Exited	4066	4124	4107	4097	4043	4070	4136
Starting Vehs	110	97	115	103	110	97	90
Ending Vehs	96	107	99	110	102	106	96
Travel Distance (mi)	2852	2904	2891	2877	2840	2838	2911
Travel Time (hr)	524.4	572.7	548.7	531.7	527.3	487.2	506.3
Total Delay (hr)	446.2	493.1	469.4	452.6	449.2	409.3	426.2
Total Stops	3490	3640	3610	3687	3296	3373	3681
Fuel Used (gal)	209.1	222.6	215.8	211.7	209.3	199.4	207.8

Summary of All Intervals

Run Number	8	9	10	Avg
Start Time	6:30	6:30	6:30	6:30
End Time	9:00	9:00	9:00	9:00
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	4103	4088	4167	4099
Vehs Exited	4110	4094	4166	4100
Starting Vehs	103	114	95	101
Ending Vehs	96	108	96	102
Travel Distance (mi)	2887	2862	2927	2879
Travel Time (hr)	512.7	586.1	526.7	532.4
Total Delay (hr)	433.6	507.4	446.5	453.3
Total Stops	3474	3525	3451	3523
Fuel Used (gal)	207.6	223.7	211.9	211.9

Interval #0 Information Seeding

Start Time	6:30
End Time	7:00
Total Time (min)	30
Volumes adjusted by Grow	th Factors.
No data recorded this inter	val.

Interval #1	Information	Recording

Start Time	7:00	
End Time	9:00	
Total Time (min)	120	
Volumes adjusted by Gr	owth Factors.	

Run Number	1	2	3	4	5	6	7
Vehs Entered	4052	4134	4091	4104	4035	4079	4142
Vehs Exited	4066	4124	4107	4097	4043	4070	4136
Starting Vehs	110	97	115	103	110	97	90
Ending Vehs	96	107	99	110	102	106	96
Travel Distance (mi)	2852	2904	2891	2877	2840	2838	2911
Travel Time (hr)	524.4	572.7	548.7	531.7	527.3	487.2	506.3
Total Delay (hr)	446.2	493.1	469.4	452.6	449.2	409.3	426.2
Total Stops	3490	3640	3610	3687	3296	3373	3681
Fuel Used (gal)	209.1	222.6	215.8	211.7	209.3	199.4	207.8

Interval #1 Information Recording

Start Time	7:00		
End Time	9:00		
Total Time (min)	120		
Volumes adjusted by Grov	wth Factors.		

Run Number	8	9	10	Avg	
Vehs Entered	4103	4088	4167	4099	
Vehs Exited	4110	4094	4166	4100	
Starting Vehs	103	114	95	101	
Ending Vehs	96	108	96	102	
Travel Distance (mi)	2887	2862	2927	2879	
Travel Time (hr)	512.7	586.1	526.7	532.4	
Total Delay (hr)	433.6	507.4	446.5	453.3	
Total Stops	3474	3525	3451	3523	
Fuel Used (gal)	207.6	223.7	211.9	211.9	

Intersection: 1: SR 528 EB Ramps & Dallas Boulevard

Movement	EB	EB	NB
Directions Served	L	R	T
Maximum Queue (ft)	227	107	105
Average Queue (ft)	71	19	5
95th Queue (ft)	161	64	70
Link Distance (ft)	1607		1254
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		720	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Dallas Boulevard & SR 528 WB Ramps

Movement	NB	SB
Directions Served	LT	TR
Maximum Queue (ft)	532	77
Average Queue (ft)	218	14
95th Queue (ft)	432	50
Link Distance (ft)	569	253
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	2	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Starry Street & Dallas Boulevard

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	77	273	215	1304
Average Queue (ft)	32	106	94	1269
95th Queue (ft)	57	195	157	1290
Link Distance (ft)	972	978	253	1246
Upstream Blk Time (%)			0	100
Queuing Penalty (veh)			0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 2

	٠	•	4	†	ļ	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	*	7				
Traffic Volume (vph)	540	280	0	680	220	0
Future Volume (vph)	540	280	0	680	220	0
Satd. Flow (prot)	1770	1583	0	1863	1863	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	1583	0	1863	1863	0
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%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	568	295	0	716	232	0
Sign Control	Stop			Free	Free	
Intersection Summary						

Control Type: Unsignalized Intersection Capacity Utilization 72.4%

ICU Level of Service C

Analysis Period (min) 15

	٠	•	•	†	↓	4
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				र्स	f)	
Traffic Volume (vph)	0	0	140	1080	220	250
Future Volume (vph)	0	0	140	1080	220	250
Satd. Flow (prot)	0	0	0	1852	1729	0
Flt Permitted				0.994		
Satd. Flow (perm)	0	0	0	1852	1729	0
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%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	1284	495	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utiliza				IC	CU Level	of Service I
Analysis Period (min) 15						

	ᄼ	→	\rightarrow	•	←	•	•	†	/	>	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	20	20	30	170	20	20	50	640	390	20	270	20
Future Volume (vph)	20	20	30	170	20	20	50	640	390	20	270	20
Satd. Flow (prot)	0	1730	0	0	1767	0	0	1768	0	0	1840	0
Flt Permitted		0.986			0.961			0.998			0.997	
Satd. Flow (perm)	0	1730	0	0	1767	0	0	1768	0	0	1840	0
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%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	74	0	0	221	0	0	1138	0	0	326	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Control Type: Unsignalized Intersection Capacity Utilization 97.5%

ICU Level of Service F

Analysis Period (min) 15

Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	4:30	4:30	4:30	4:30	4:30	4:30	4:30
End Time	7:00	7:00	7:00	7:00	7:00	7:00	7:00
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	3328	3408	3415	3410	3431	3468	3453
Vehs Exited	3351	3419	3426	3415	3430	3463	3445
Starting Vehs	167	157	150	150	146	143	137
Ending Vehs	144	146	139	145	147	148	145
Travel Distance (mi)	2349	2384	2396	2378	2414	2421	2421
Travel Time (hr)	1067.1	1260.2	1188.5	1077.3	1190.5	1106.9	1125.7
Total Delay (hr)	1003.8	1195.8	1124.0	1013.3	1125.7	1041.6	1060.5
Total Stops	4193	4291	4895	4635	4161	4652	4274
Fuel Used (gal)	311.7	356.6	340.4	314.3	341.4	322.6	327.5

Summary of All Intervals

Run Number	8	9	10	Avg	
Start Time	4:30	4:30	4:30	4:30	
End Time	7:00	7:00	7:00	7:00	
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	3442	3396	3508	3428	
Vehs Exited	3427	3397	3481	3425	
Starting Vehs	139	151	131	148	
Ending Vehs	154	150	158	147	
Travel Distance (mi)	2387	2354	2439	2394	
Travel Time (hr)	1195.3	1322.2	1243.9	1177.8	
Total Delay (hr)	1131.1	1258.9	1178.2	1113.3	
Total Stops	4842	4919	4590	4545	
Fuel Used (gal)	341.1	368.3	354.1	337.8	

Interval #0 Information Seeding

Start Time	4:30		
End Time	5:00		
Total Time (min)	30		
Volumes adjusted by Grow	Volumes adjusted by Growth Factors.		
No data recorded this inter-	val.		

Interval #1 Information Recording

Start Time	5:00	
End Time	7:00	
Total Time (min)	120	
Volumes adjusted by Gr	rowth Factors.	

Run Number	1	2	3	4	5	6	7
Vehs Entered	3328	3408	3415	3410	3431	3468	3453
Vehs Exited	3351	3419	3426	3415	3430	3463	3445
Starting Vehs	167	157	150	150	146	143	137
Ending Vehs	144	146	139	145	147	148	145
Travel Distance (mi)	2349	2384	2396	2378	2414	2421	2421
Travel Time (hr)	1067.1	1260.2	1188.5	1077.3	1190.5	1106.9	1125.7
Total Delay (hr)	1003.8	1195.8	1124.0	1013.3	1125.7	1041.6	1060.5
Total Stops	4193	4291	4895	4635	4161	4652	4274
Fuel Used (gal)	311.7	356.6	340.4	314.3	341.4	322.6	327.5

Interval #1 Information Recording

Start Time	5:00	
End Time	7:00	
Total Time (min)	120	
Volumes adjusted b	by Growth Factors.	

Run Number	8	9	10	Avg	
Vehs Entered	3442	3396	3508	3428	
Vehs Exited	3427	3397	3481	3425	
Starting Vehs	139	151	131	148	
Ending Vehs	154	150	158	147	
Travel Distance (mi)	2387	2354	2439	2394	
Travel Time (hr)	1195.3	1322.2	1243.9	1177.8	
Total Delay (hr)	1131.1	1258.9	1178.2	1113.3	
Total Stops	4842	4919	4590	4545	
Fuel Used (gal)	341.1	368.3	354.1	337.8	

Intersection: 1: SR 528 EB Ramps & Dallas Boulevard

Movement	EB	EB
Directions Served	L	R
Maximum Queue (ft)	1622	820
Average Queue (ft)	1616	802
95th Queue (ft)	1622	998
Link Distance (ft)	1607	
Upstream Blk Time (%)	46	
Queuing Penalty (veh)	376	
Storage Bay Dist (ft)		720
Storage Blk Time (%)	100	
Queuing Penalty (veh)	280	

Intersection: 2: Dallas Boulevard & SR 528 WB Ramps

NB	SB	
LT	TR	
392	3	
133	0	
295	3	
569	253	
	LT 392 133 295	LT TR 392 3 133 0 295 3

Intersection: 3: Starry Street & Dallas Boulevard

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	62	103	260	121
Average Queue (ft)	31	50	211	57
95th Queue (ft)	53	79	293	91
Link Distance (ft)	972	978	253	1246
Upstream Blk Time (%)			2	
Queuing Penalty (veh)			17	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 673

MOVEMENT SUMMARY

♥ Site: 1 [Dallas Boulevard at SR 528 EB Ramps (Site Folder:

2030 AM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2030 AM Build Site Category: (None)

Roundabout

Vehi	icle M	ovemen	t Perfo	rmance										
Mov ID	Turn	INP VOLU		DEMAND FLOWS		Deg. Satn		Level of Service		ACK OF EUE	Prop. Effective Que Stop		Aver. No.	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] ft		Rate	Cycles	mph
Sout	h: Dalla	as Boulev	ard											
8	T1	260	2.0	274	2.0	0.341	6.6	LOSA	1.9	47.7	0.43	0.30	0.43	21.3
18	R2	100	2.0	105	2.0	0.341	6.6	LOSA	1.9	47.7	0.43	0.30	0.43	31.0
Appr	oach	360	2.0	379	2.0	0.341	6.6	LOSA	1.9	47.7	0.43	0.30	0.43	24.7
North	n: Dalla	s Boulev	ard											
7	L2	60	2.0	63	2.0	0.327	5.6	LOSA	0.0	0.0	0.00	0.00	0.00	36.7
4	T1	360	2.0	379	2.0	0.327	5.6	LOSA	0.0	0.0	0.00	0.00	0.00	34.2
Appr	oach	420	2.0	442	2.0	0.327	5.6	LOSA	0.0	0.0	0.00	0.00	0.00	34.7
West	t: SR 5	28 EB Of	f-Ramp											
5	L2	120	2.0	126	2.0	0.137	5.2	LOSA	0.5	13.7	0.48	0.41	0.48	26.8
12	R2	140	2.0	147	2.0	0.150	5.1	LOSA	0.6	15.4	0.46	0.37	0.46	32.1
Appr	oach	260	2.0	274	2.0	0.150	5.1	LOSA	0.6	15.4	0.47	0.39	0.47	29.5
All Vehic	cles	1040	2.0	1095	2.0	0.341	5.8	LOSA	1.9	47.7	0.27	0.20	0.27	29.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▼ Site: 2 [Dallas Boulevard at SR 528 WB Ramps (Site Folder:

2030 AM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2030 AM Build Site Category: (None)

Roundabout

Vehi	cle M	ovemen	t Perfoi	rmance										
Mov ID				EMAND Deg. LOWS Satn			Level of Service		ACK OF EUE	Prop. E Que	Effective Stop	Aver. No.	Aver. Speed	
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] ft		Rate	Cycles	mph
South	h: Dalla	as Boulev	/ard											
3	L2	170	2.0	179	2.0	0.296	5.3	LOSA	0.0	0.0	0.00	0.00	0.00	35.0
8	T1	210	2.0	221	2.0	0.296	5.3	LOSA	0.0	0.0	0.00	0.00	0.00	31.9
Appr	oach	380	2.0	400	2.0	0.296	5.3	LOSA	0.0	0.0	0.00	0.00	0.00	33.6
East:	SR 52	28 WB Of	f-Ramp											
1	L2	70	2.0	74	2.0	0.077	4.4	LOSA	0.3	7.4	0.44	0.34	0.44	27.2
16	R2	50	2.0	53	2.0	0.046	3.6	LOSA	0.2	4.5	0.32	0.19	0.32	33.2
Appr	oach	120	2.0	126	2.0	0.077	4.1	LOSA	0.3	7.4	0.39	0.28	0.39	29.5
North	n: Dalla	s Boulev	ard											
4	T1	350	2.0	368	2.0	0.335	6.6	LOSA	1.7	42.2	0.45	0.34	0.45	25.0
14	R2	500	2.0	526	2.0	0.321	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	36.0
Appr	oach	850	2.0	895	2.0	0.335	2.7	LOSA	1.7	42.2	0.19	0.14	0.19	32.2
All Vehic	cles	1350	2.0	1421	2.0	0.335	3.5	LOSA	1.7	42.2	0.15	0.11	0.15	32.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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QUEUE ANALYSIS

orall Site: 1 [Dallas Boulevard at SR 528 EB Ramps (Site Folder: 2030 AM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2030 AM Build Site Category: (None) Roundabout

Lane Que	<u> </u>														
Lane	Contin.	Deg.		Overflow	Back	of Queue			Cycle A			eue		Prob.	Ov.
Number	Lane	Satn	Factor	Queue		(ft)		f Green		eue	Storag	e Ratio	Block. S	SL Ov. I	
			(Queue)	(ft)				ft)	(f						No.
		v/c			Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	
South: Dallas Boulevard															
Lane 1		0.341	1.000	0.0	19.2	47.7	NA	NA	17.7	32.1	0.03	0.07	0.0	NA	NA
Approach		0.341			19.2	47.7	NA	NA	17.7	32.1	0.03	0.07			
North: Dall	as Boule	/ard													
Lane 1		0.327	1.000	0.0	0.0	0.0	NA	NA	17.4	31.6	0.00	0.00	0.0	NA	NA
Approach		0.327			0.0	0.0	NA	NA	17.4	31.6	0.00	0.00			
West: SR 5	528 EB O	ff-Ramp)												
Lane 1		0.137	1.000	0.0	5.5	13.7	NA	NA	4.6	8.4	0.00	0.01	0.0	NA	NA
Lane 2		0.150	1.000	0.0	6.2	15.4	NA	NA	5.3	9.6	0.01	0.02	0.0	NA	NA
Approach		0.150			6.2	15.4	NA	NA	5.3	9.6	0.01	0.02			
Intersection	า	0.341			19.2	47.7	NA	NA	17.7	32.1	0.03	0.07			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Lane Que	ues (Ve	hicles)													
Lane Number	Contin. Lane	Deg. Satn (Prog. (Factor Queue)	Overflow Queue (veh)		of Queue reh)	Start o	ue at (f Green eh)	Qu	Average eue eh)		eue e Ratio	Prob. Block. S	Prob. L Ov. I	Ov. ₋ane No.
		v/c			Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	
South: Dallas Boulevard															
Lane 1		0.341	1.000	0.0	8.0	1.9	NA	NA	0.7	1.3	0.03	0.07	0.0	NA	NA
Approach		0.341			8.0	1.9	NA	NA	0.7	1.3	0.03	0.07			
North: Dallas Boulevard															
Lane 1		0.327	1.000	0.0	0.0	0.0	NA	NA	0.7	1.2	0.00	0.00	0.0	NA	NA
Approach		0.327			0.0	0.0	NA	NA	0.7	1.2	0.00	0.00			
West: SR 5	28 EB O	ff-Ramp)												
Lane 1		0.137	1.000	0.0	0.2	0.5	NA	NA	0.2	0.3	0.00	0.01	0.0	NA	NA
Lane 2		0.150	1.000	0.0	0.2	0.6	NA	NA	0.2	0.4	0.01	0.02	0.0	NA	NA
Approach		0.150			0.2	0.6	NA	NA	0.2	0.4	0.01	0.02			
Intersection	1	0.341			8.0	1.9	NA	NA	0.7	1.3	0.03	0.07			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Continuous Lane Performance														
Lane Number	Deg.	Unint.	Unint.	Hdwy Spacing	Aver.	Оссир.	Space	Space	Time	Densi	ity	LOS		
	Satn	Speed	Travel		Vehicle	Time	Time	Occup.	Occup.			(Density		
			Delay		Length			Ratio	Ratio			Method)		
	v/c	mph	sec	sec f	ft	sec	sec	%	%	veh/mi	pc/mi			

South: Dallas Boulevard

This approach does not have any continuous lanes

North: Dallas Boulevard

This approach does not have any continuous lanes

West: SR 528 EB Off-Ramp

This approach does not have any continuous lanes

Midblock Effective Detection Zone Length = 7 ft

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QUEUE ANALYSIS

♥ Site: 2 [Dallas Boulevard at SR 528 WB Ramps (Site Folder:

2030 AM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2030 AM Build Site Category: (None) Roundabout

Lane Que	ues (Di	stance)												
Lane Number	Contin. Lane		Prog. (Factor (Queue)	Overflow Queue (ft)	Back	of Queue (ft)	Start o	f Green ft)	Qu	verage eue t)		eue e Ratio	Block. S		Ov. ₋ane No.
0 11 5 11	·	v/c			Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	
South: Dall	as Boule	vard													
Lane 1		0.296	1.000	0.0	0.0	0.0	NA	NA	14.8	26.9	0.00	0.00	0.0	NA	NA
Approach		0.296			0.0	0.0	NA	NA	14.8	26.9	0.00	0.00			
East: SR 52	28 WB O	ff-Ramp)												
Lane 1		0.077	1.000	0.0	3.0	7.4	NA	NA	2.3	4.2	0.00	0.00	0.0	NA	NA
Lane 2		0.046	1.000	0.0	1.8	4.5	NA	NA	1.3	2.4	0.00	0.01	0.0	NA	NA
Approach		0.077			3.0	7.4	NA	NA	2.3	4.2	0.00	0.01			
North: Dalla	as Boule	/ard													
Lane 1		0.335	1.000	0.0	17.0	42.2	NA	NA	17.1	31.0	0.03	0.06	0.0	NA	NA
Lane 2	Υ	0.321	1.000	0.0	0.0	0.0	NA	NA	0.0	0.0	0.00	0.00	NA	0.0	1
Approach		0.335			17.0	42.2	NA	NA	17.1	31.0	0.03	0.06			
Intersection	1	0.335			17.0	42.2	NA	NA	17.1	31.0	0.03	0.06			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Lane Que	ues (Ve	hicles)													
Lane Number	Contin. Lane	Deg. Satn	Prog. Factor (Queue)	Overflow Queue (veh)		of Queue (eh)	Start o	ue at f Green eh)	Qu	Average eue eh)		eue e Ratio	Prob. Block. S	Prob. SL Ov. I	Ov. Lane No.
		v/c	,		Av.	95%	Av.	95%	Av.`	95%	Av.	95%	%	%	
South: Dalla	as Boule	vard													
Lane 1		0.296	1.000	0.0	0.0	0.0	NA	NA	0.6	1.1	0.00	0.00	0.0	NA	NA
Approach		0.296			0.0	0.0	NA	NA	0.6	1.1	0.00	0.00			
East: SR 52	28 WB O	ff-Ramp)												
Lane 1		0.077	1.000	0.0	0.1	0.3	NA	NA	0.1	0.2	0.00	0.00	0.0	NA	NA
Lane 2		0.046	1.000	0.0	0.1	0.2	NA	NA	0.1	0.1	0.00	0.01	0.0	NA	NA
Approach		0.077			0.1	0.3	NA	NA	0.1	0.2	0.00	0.01			
North: Dalla	as Boule	vard													
Lane 1		0.335	1.000	0.0	0.7	1.7	NA	NA	0.7	1.2	0.03	0.06	0.0	NA	NA
Lane 2	Υ	0.321	1.000	0.0	0.0	0.0	NA	NA	0.0	0.0	0.00	0.00	NA	0.0	1
Approach		0.335			0.7	1.7	NA	NA	0.7	1.2	0.03	0.06			
Intersection		0.335			0.7	1.7	NA	NA	0.7	1.2	0.03	0.06			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Continuous L	ane Pe	rforman	се								
Lane Number	Deg.	Unint.	Unint.	Hdwy Spacing	Aver.	Occup.	Space	Space	Time	Density	LOS
	Satn	Speed	Travel		Vehicle	Time	Time	Occup.	Occup.		(Density

	v/c	mph	Delay sec	sec	ft	Length ft	sec	sec	Ratio %	Ratio % veh/m	i pc/mi	Method)
South: Dallas I												
This approach	does not h	ave any o	continuo	us lanes								
East: SR 528 \	NB Off-Rar	mp										
This approach	does not h	ave any o	continuo	us lanes								
North: Dallas E	Boulevard											
Lane 2	0.321	39.9	0.0	6.84	399.8	17.4	0.69	6.15	4.3	10.1 13.2	13.4	LOS B

Midblock Effective Detection Zone Length = 7 ft

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MOVEMENT SUMMARY

♥ Site: 1 [Dallas Boulevard at SR 528 EB Ramps (Site Folder:

2030 PM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2050 PM Build Site Category: (None)

Roundabout

Vehi	cle Mo	ovemen	t Perfor	mance										
Mov ID	Turn	INP VOLU	MES	DEM/ FLO	WS	Deg. Satn		Level of Service	QUI	ACK OF EUE	Prop. E Que	ffective Stop	Aver. No.	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] ft		Rate	Cycles	mph
South	n: Dalla	as Boulev	ard											
8	T1	210	2.0	221	2.0	0.340	8.2	LOSA	1.6	41.6	0.61	0.58	0.61	20.5
18	R2	60	2.0	63	2.0	0.340	8.2	LOSA	1.6	41.6	0.61	0.58	0.61	30.0
Appro	oach	270	2.0	284	2.0	0.340	8.2	LOSA	1.6	41.6	0.61	0.58	0.61	23.2
North	ı: Dalla	s Bouleva	ard											
7	L2	40	2.0	42	2.0	0.210	4.4	LOSA	0.0	0.0	0.00	0.00	0.00	36.6
4	T1	230	2.0	242	2.0	0.210	4.4	LOSA	0.0	0.0	0.00	0.00	0.00	34.2
Appro	oach	270	2.0	284	2.0	0.210	4.4	LOSA	0.0	0.0	0.00	0.00	0.00	34.7
West	: SR 52	28 EB Off	f-Ramp											
5	L2	400	2.0	421	2.0	0.394	7.5	LOSA	2.0	52.0	0.50	0.40	0.50	25.7
12	R2	160	2.0	168	2.0	0.151	4.6	LOSA	0.6	16.1	0.37	0.25	0.37	32.4
Appro	oach	560	2.0	589	2.0	0.394	6.7	LOSA	2.0	52.0	0.47	0.36	0.47	27.4
All Vehic	eles	1100	2.0	1158	2.0	0.394	6.5	LOSA	2.0	52.0	0.39	0.33	0.39	27.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▼ Site: 2 [Dallas Boulevard at SR 528 WB Ramps (Site Folder:

2030 PM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2050 PM Build Site Category: (None) Roundabout

Vehi	cle M	ovemen	t Perfor	rmance										
Mov ID	Turn	INP VOLU	IMES	DEM. FLO	WS	Deg. Satn		Level of Service	QUE	ACK OF EUE	Prop. E Que	ffective Stop	Aver. No.	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] ft		Rate	Cycles	mph
South	n: Dalla	as Boulev	ard											
3	L2	70	2.0	74	2.0	0.475	7.4	LOSA	0.0	0.0	0.00	0.00	0.00	36.8
8	T1	540	2.0	568	2.0	0.475	7.4	LOSA	0.0	0.0	0.00	0.00	0.00	34.4
Appro	oach	610	2.0	642	2.0	0.475	7.4	LOSA	0.0	0.0	0.00	0.00	0.00	34.9
East:	SR 52	8 WB Of	f-Ramp											
1	L2	110	2.0	116	2.0	0.151	6.3	LOSA	0.6	14.6	0.56	0.54	0.56	26.3
16	R2	70	2.0	74	2.0	0.090	5.3	LOSA	0.3	8.5	0.52	0.46	0.52	32.0
Appro	oach	180	2.0	189	2.0	0.151	5.9	LOS A	0.6	14.6	0.55	0.51	0.55	28.3
North	ı: Dalla	s Boulev	ard											
4	T1	160	2.0	168	2.0	0.144	4.3	LOSA	0.6	15.4	0.33	0.20	0.33	26.9
14	R2	190	2.0	200	2.0	0.122	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	36.0
Appro	oach	350	2.0	368	2.0	0.144	2.0	LOS A	0.6	15.4	0.15	0.09	0.15	32.7
All Vehic	eles	1140	2.0	1200	2.0	0.475	5.5	LOSA	0.6	15.4	0.13	0.11	0.13	32.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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QUEUE ANALYSIS

orall Site: 1 [Dallas Boulevard at SR 528 EB Ramps (Site Folder: 2030 PM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2050 PM Build Site Category: (None)
Roundabout

Lane Que	ues (Dis	tance))												
Lane Number	Contin. Lane		Prog. (Factor Queue)	Overflow Queue (ft)		of Queue (ft)	Start o	f Green ft)	(f	eue t)	Storag	eue e Ratio	Block. S		Ov. Lane No.
		v/c			Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	
South: Dalla	as Boule	/ard													
Lane 1		0.340	1.000	0.0	16.7	41.6	NA	NA	16.5	29.9	0.03	0.06	0.0	NA	NA
Approach		0.340			16.7	41.6	NA	NA	16.5	29.9	0.03	0.06			
North: Dalla	s Boulev	ard													
Lane 1		0.210	1.000	0.0	0.0	0.0	NA	NA	8.9	16.1	0.00	0.00	0.0	NA	NA
Approach		0.210			0.0	0.0	NA	NA	8.9	16.1	0.00	0.00			
West: SR 52	28 EB Of	f-Ramp	•												
Lane 1		0.394	1.000	0.0	20.9	52.0	NA	NA	22.3	40.4	0.01	0.03	0.0	NA	NA
Lane 2		0.151	1.000	0.0	6.5	16.1	NA	NA	5.4	9.9	0.01	0.02	0.0	NA	NA
Approach		0.394			20.9	52.0	NA	NA	22.3	40.4	0.01	0.03			
Intersection		0.394			20.9	52.0	NA	NA	22.3	40.4	0.03	0.06			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Lane Que	ues (Ve	hicles)													
Lane Number	Contin. Lane	Deg. Satn (Prog. Factor Queue)	Overflow Queue (veh)		of Queue /eh)	Start o	ue at f Green eh)	Qu	Average eue eh)		eue e Ratio	Block. S		Ov. Lane No.
		v/c			Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	
South: Dalla	as Boule	vard													
Lane 1		0.340	1.000	0.0	0.7	1.6	NA	NA	0.6	1.2	0.03	0.06	0.0	NA	NA
Approach		0.340			0.7	1.6	NA	NA	0.6	1.2	0.03	0.06			
North: Dalla	as Boulev	/ard													
Lane 1		0.210	1.000	0.0	0.0	0.0	NA	NA	0.3	0.6	0.00	0.00	0.0	NA	NA
Approach		0.210			0.0	0.0	NA	NA	0.3	0.6	0.00	0.00			
West: SR 5	28 EB O	ff-Ramp)												
Lane 1		0.394	1.000	0.0	8.0	2.0	NA	NA	0.9	1.6	0.01	0.03	0.0	NA	NA
Lane 2		0.151	1.000	0.0	0.3	0.6	NA	NA	0.2	0.4	0.01	0.02	0.0	NA	NA
Approach		0.394			8.0	2.0	NA	NA	0.9	1.6	0.01	0.03			
Intersection	1	0.394			8.0	2.0	NA	NA	0.9	1.6	0.03	0.06			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Continuous L	ane Pe	rforman	се									
Lane Number	Deg.	Unint.	Unint.	Hdwy Spacing	Aver.	Оссир.	Space	Space	Time	Densi	ity	LOS
	Satn	Speed	Travel		Vehicle	Time	Time	Occup.	Occup.			(Density
			Delay		Length			Ratio	Ratio			Method)
	v/c	mph	sec	sec f	ft	sec	sec	%	%	veh/mi	pc/mi	

South: Dallas Boulevard

This approach does not have any continuous lanes

North: Dallas Boulevard

This approach does not have any continuous lanes

West: SR 528 EB Off-Ramp

This approach does not have any continuous lanes

Midblock Effective Detection Zone Length = 7 ft

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QUEUE ANALYSIS

♥ Site: 2 [Dallas Boulevard at SR 528 WB Ramps (Site Folder:

2030 PM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2050 PM Build Site Category: (None) Roundabout

Lane Que	ues (Di	stance)												
Lane Number	Contin. Lane		Prog. (Factor (Queue)	Overflow Queue (ft)		of Queue (ft)	Start o	f Green ft)	(1	eue (†	Storag	eue e Ratio	Block. S		Ov. Lane No.
South: Dall	ac Roulo	vord			Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	
South. Dan	as Doule														
Lane 1		0.475	1.000	0.0	0.0	0.0	NA	NA	33.6	60.9	0.00	0.00	0.0	NA	NA
Approach		0.475			0.0	0.0	NA	NA	33.6	60.9	0.00	0.00			
East: SR 5	28 WB O	ff-Ramp)												
Lane 1		0.151	1.000	0.0	5.9	14.6	NA	NA	5.1	9.3	0.00	0.01	0.0	NA	NA
Lane 2		0.090	1.000	0.0	3.4	8.5	NA	NA	2.7	5.0	0.01	0.02	0.0	NA	NA
Approach		0.151			5.9	14.6	NA	NA	5.1	9.3	0.01	0.02			
North: Dalla	as Boule	/ard													
Lane 1		0.144	1.000	0.0	6.2	15.4	NA	NA	5.1	9.3	0.01	0.02	0.0	NA	NA
Lane 2	Υ	0.122	1.000	0.0	0.0	0.0	NA	NA	0.0	0.0	0.00	0.00	NA	0.0	1
Approach		0.144			6.2	15.4	NA	NA	5.1	9.3	0.01	0.02			
Intersection	า	0.475			6.2	15.4	NA	NA	33.6	60.9	0.01	0.02			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Lane Que	ues (Ve	hicles)													
Lane Number	Contin. Lane		Prog. Factor Queue)	Overflow Queue (veh)	(\	of Queue /eh)	Start o	f Green eh)	(ve	eue eh)	Storag	eue e Ratio	Block. S		Ov. Lane No.
South: Dall	as Boule	v/c vard	_	_	Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	_
Lane 1		0.475	1.000	0.0	0.0	0.0	NA	NA	1.3	2.4	0.00	0.00	0.0	NA	NA
Approach		0.475			0.0	0.0	NA	NA	1.3	2.4	0.00	0.00			
East: SR 5	28 WB O	ff-Ramp)												
Lane 1		0.151	1.000	0.0	0.2	0.6	NA	NA	0.2	0.4	0.00	0.01	0.0	NA	NA
Lane 2		0.090	1.000	0.0	0.1	0.3	NA	NA	0.1	0.2	0.01	0.02	0.0	NA	NA
Approach		0.151			0.2	0.6	NA	NA	0.2	0.4	0.01	0.02			
North: Dalla	as Boule	vard													
Lane 1		0.144	1.000	0.0	0.2	0.6	NA	NA	0.2	0.4	0.01	0.02	0.0	NA	NA
Lane 2	Υ	0.122	1.000	0.0	0.0	0.0	NA	NA	0.0	0.0	0.00	0.00	NA	0.0	1
Approach		0.144			0.2	0.6	NA	NA	0.2	0.4	0.01	0.02			
Intersection	ı	0.475			0.2	0.6	NA	NA	1.3	2.4	0.01	0.02			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Continuous L	ane Pe	rforman	ce								
Lane Number	Deg.	Unint.	Unint.	Hdwy Spacing	Aver.	Occup.	Space	Space	Time	Density	LOS
	Satn	Speed	Travel		Vehicle	Time	Time	Occup.	Occup.		(Density

	v/c	mph	Delay sec	sec	ft	Length ft	sec	sec	Ratio %	Ratio % ve	eh/mi	pc/mi	Method)
South: Dallas E	Boulevard												
This approach	does not h	ave any o	continuo	us lanes	3								
East: SR 528 V	VB Off-Rar	np											
This approach	does not h	ave any o	continuo	us lanes	;								
North: Dallas B	oulevard												
Lane 2	0.122	40.0	0.0	18.00	1054.8	17.4	0.69	17.31	1.6	3.8	5.0	5.1	LOSA

Midblock Effective Detection Zone Length = 7 ft

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MOVEMENT SUMMARY

♥ Site: 1 [Dallas Boulevard at SR 528 EB Ramps (Site Folder:

2050 AM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2050 AM Build Site Category: (None)

Roundabout

Vehi	cle Mo	ovemen	t Perfoi	rmance										
Mov ID	Turn	INP VOLU		DEM. FLO		Deg. Satn		Level of Service		ACK OF EUE	Prop. Que	Effective Stop	Aver. No.	Aver. Speed
טו		[Total veh/h	HV]	[Total veh/h	HV] %	v/c	sec	Service	[Veh. veh	Dist] ft	Que	Rate	Cycles	mph
Sout	h: Dalla	as Boulev	ard											
8	T1	510	2.0	537	2.0	0.751	17.4	LOS C	14.0	355.6	0.86	1.07	1.56	16.4
18	R2	200	2.0	211	2.0	0.751	17.4	LOS C	14.0	355.6	0.86	1.07	1.56	25.5
Appr	oach	710	2.0	747	2.0	0.751	17.4	LOS C	14.0	355.6	0.86	1.07	1.56	19.5
North	n: Dalla	s Boulev	ard											
7	L2	130	2.0	137	2.0	0.607	9.7	LOSA	0.0	0.0	0.00	0.00	0.00	36.5
4	T1	650	2.0	684	2.0	0.607	9.7	LOSA	0.0	0.0	0.00	0.00	0.00	34.0
Appr	oach	780	2.0	821	2.0	0.607	9.7	LOSA	0.0	0.0	0.00	0.00	0.00	34.6
West	t: SR 52	28 EB Of	f-Ramp											
5	L2	150	2.0	158	2.0	0.243	8.5	LOSA	0.9	23.8	0.64	0.64	0.64	25.2
12	R2	240	2.0	253	2.0	0.342	9.1	LOSA	1.5	38.8	0.65	0.67	0.71	29.6
Appr	oach	390	2.0	411	2.0	0.342	8.9	LOSA	1.5	38.8	0.64	0.66	0.68	27.8
All Vehic	cles	1880	2.0	1979	2.0	0.751	12.4	LOS B	14.0	355.6	0.46	0.54	0.73	25.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

2050 AM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2050 AM Build Site Category: (None) Roundabout

Vehi	cle M	ovemen	t Perfo	rmance										
Mov ID	Turn	INP VOLU [Total	MES HV]	DEM/ FLO [Total	WS HV]	Deg. Satn	Delay	Level of Service	QUI [Veh.	ACK OF EUE Dist]	Prop. E Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
0 11	- D	veh/h	%	veh/h	%	v/c	sec		veh	ft				mph
Souti	n: Dalla	as Boulev	ard											
3	L2	270	2.0	284	2.0	0.514	8.0	LOSA	0.0	0.0	0.00	0.00	0.00	35.2
8	T1	390	2.0	411	2.0	0.514	8.0	LOSA	0.0	0.0	0.00	0.00	0.00	32.2
Appr	oach	660	2.0	695	2.0	0.514	8.0	LOSA	0.0	0.0	0.00	0.00	0.00	33.8
East:	SR 52	28 WB Off	f-Ramp											
1	L2	110	2.0	116	2.0	0.159	6.6	LOSA	0.6	15.3	0.58	0.58	0.58	26.1
16	R2	50	2.0	53	2.0	0.055	4.3	LOSA	0.2	5.3	0.44	0.33	0.44	32.7
Appr	oach	160	2.0	168	2.0	0.159	5.9	LOSA	0.6	15.3	0.54	0.50	0.54	27.9
North	n: Dalla	s Boulev	ard											
4	T1	670	2.0	705	2.0	0.734	17.0	LOS C	11.1	282.8	0.84	1.12	1.61	18.7
14	R2	630	2.0	663	2.0	0.404	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	35.9
Appr	oach	1300	2.0	1368	2.0	0.734	8.8	LOSA	11.1	282.8	0.43	0.58	0.83	27.1
All Vehic	cles	2120	2.0	2232	2.0	0.734	8.3	LOSA	11.1	282.8	0.30	0.39	0.55	28.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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QUEUE ANALYSIS

orall Site: 1 [Dallas Boulevard at SR 528 EB Ramps (Site Folder: 2050 AM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2050 AM Build Site Category: (None) Roundabout

Lane Que	ues (Dis	stance)												
Lane Number	Contin. Lane		Prog. (Factor (Queue)	Overflow Queue (ft)	•	of Queue (ft)	Start o	f Green ft)	Qu (1	verage eue ft)	Storag	eue e Ratio	Prob. Block. S	SL Ov. I	Ov. Lane No.
South: Dall	as Boule	v/c vard			Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	
Lane 1		0.751	1.000	47.1	143.1	355.6	NA	NA	91.6	166.1	0.22	0.54	0.0	NA	NA
Approach		0.751			143.1	355.6	NA	NA	91.6	166.1	0.22	0.54			
North: Dalla	as Boulev	/ard													
Lane 1		0.607	1.000	0.0	0.0	0.0	NA	NA	56.3	102.1	0.00	0.00	0.0	NA	NA
Approach		0.607			0.0	0.0	NA	NA	56.3	102.1	0.00	0.00			
West: SR 5	28 EB O	ff-Ramp)												
Lane 1		0.243	1.000	0.0	9.6	23.8	NA	NA	9.5	17.2	0.01	0.02	0.0	NA	NA
Lane 2		0.342	1.000	0.9	15.6	38.8	NA	NA	16.2	29.5	0.02	0.06	0.0	NA	NA
Approach		0.342			15.6	38.8	NA	NA	16.2	29.5	0.02	0.06			
Intersection	า	0.751			143.1	355.6	NA	NA	91.6	166.1	0.22	0.54			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Lane Que	ues (Ve	hicles)													
Lane Number	Contin. Lane	Deg. Satn (Prog. Factor Queue)	Overflow Queue (veh)		of Queue /eh)	Start o	ue at f Green eh)	Qu	Average eue eh)		eue e Ratio	Block. S		Ov. ₋ane No.
		v/c			Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	
South: Dalla	as Boule	vard													
Lane 1		0.751	1.000	1.9	5.6	14.0	NA	NA	3.6	6.5	0.22	0.54	0.0	NA	NA
Approach		0.751			5.6	14.0	NA	NA	3.6	6.5	0.22	0.54			
North: Dalla	as Boulev	/ard													
Lane 1		0.607	1.000	0.0	0.0	0.0	NA	NA	2.2	4.0	0.00	0.00	0.0	NA	NA
Approach		0.607			0.0	0.0	NA	NA	2.2	4.0	0.00	0.00			
West: SR 5	28 EB O	ff-Ramp)												
Lane 1		0.243	1.000	0.0	0.4	0.9	NA	NA	0.4	0.7	0.01	0.02	0.0	NA	NA
Lane 2		0.342	1.000	0.0	0.6	1.5	NA	NA	0.6	1.2	0.02	0.06	0.0	NA	NA
Approach		0.342			0.6	1.5	NA	NA	0.6	1.2	0.02	0.06			
Intersection	1	0.751			5.6	14.0	NA	NA	3.6	6.5	0.22	0.54			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Continuous L	ane Pe	rforman	се								
Lane Number	Deg. Satn		Travel	Hdwy Spacing	Vehicle	Occup. Time		Occup.	Occup.	Density	LOS (Density
	v/c	mph	Delay sec	sec ft	Length ft	sec	sec	Ratio %	Ratio %	veh/mi pc/mi	Method)

South: Dallas Boulevard

This approach does not have any continuous lanes

North: Dallas Boulevard

This approach does not have any continuous lanes

West: SR 528 EB Off-Ramp

This approach does not have any continuous lanes

Midblock Effective Detection Zone Length = 7 ft

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QUEUE ANALYSIS

♥ Site: 2 [Dallas Boulevard at SR 528 WB Ramps (Site Folder:

2050 AM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2050 AM Build Site Category: (None) Roundabout

Lane Que	ues (Di	stance)												
Lane Number	Contin. Lane		Prog. (Factor (Queue)	Overflow Queue (ft)		of Queue (ft)		f Green t)	Qu	\verage eue ft)		eue e Ratio	Block. S		Ov. ₋ane No.
0 11 5 11	·	v/c			Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	
South: Dall	as Boule	vard													
Lane 1		0.514	1.000	0.0	0.0	0.0	NA	NA	39.2	71.2	0.00	0.00	0.0	NA	NA
Approach		0.514			0.0	0.0	NA	NA	39.2	71.2	0.00	0.00			
East: SR 5	28 WB O	ff-Ramp)												
Lane 1		0.159	1.000	0.0	6.1	15.3	NA	NA	5.4	9.9	0.00	0.01	0.0	NA	NA
Lane 2		0.055	1.000	0.0	2.1	5.3	NA	NA	1.6	2.9	0.01	0.01	0.0	NA	NA
Approach		0.159			6.1	15.3	NA	NA	5.4	9.9	0.01	0.01			
North: Dalla	as Boule	/ard													
Lane 1		0.734	1.000	40.2	113.8	282.8	NA	NA	84.7	153.6	0.17	0.43	0.0	NA	NA
Lane 2	Υ	0.404	1.000	0.0	0.0	0.0	NA	NA	0.0	0.0	0.00	0.00	NA	0.0	1
Approach		0.734			113.8	282.8	NA	NA	84.7	153.6	0.17	0.43			
Intersection	1	0.734			113.8	282.8	NA	NA	84.7	153.6	0.17	0.43			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Lane Que	ues (Ve	hicles)													
Lane Number	Contin. Lane	Deg. Satn	Prog. Factor (Queue)	Overflow Queue (veh)		of Queue /eh)	Start o	ue at f Green eh)		Average eue eh)		eue e Ratio	Prob. Block. S	Prob. SL Ov. I	Ov. Lane No.
		v/c	,		Av.	95%	Av.	95%	Av.`	95%	Av.	95%	%	%	
South: Dalla	as Boule	vard													
Lane 1		0.514	1.000	0.0	0.0	0.0	NA	NA	1.5	2.8	0.00	0.00	0.0	NA	NA
Approach		0.514			0.0	0.0	NA	NA	1.5	2.8	0.00	0.00			
East: SR 52	28 WB O	ff-Ramp)												
Lane 1		0.159	1.000	0.0	0.2	0.6	NA	NA	0.2	0.4	0.00	0.01	0.0	NA	NA
Lane 2		0.055	1.000	0.0	0.1	0.2	NA	NA	0.1	0.1	0.01	0.01	0.0	NA	NA
Approach		0.159			0.2	0.6	NA	NA	0.2	0.4	0.01	0.01			
North: Dalla	as Boule	vard													
Lane 1		0.734	1.000	1.6	4.5	11.1	NA	NA	3.3	6.0	0.17	0.43	0.0	NA	NA
Lane 2	Υ	0.404	1.000	0.0	0.0	0.0	NA	NA	0.0	0.0	0.00	0.00	NA	0.0	1
Approach		0.734			4.5	11.1	NA	NA	3.3	6.0	0.17	0.43			
Intersection		0.734			4.5	11.1	NA	NA	3.3	6.0	0.17	0.43			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Continuous L	ane Pe	rforman	се								
Lane Number	Deg.	Unint.	Unint.	Hdwy Spacing	Aver.	Occup.	Space	Space	Time	Density	LOS
	Satn	Speed	Travel		Vehicle	Time	Time	Occup.	Occup.		(Density

	/-		Delay			_ength			Ratio	Ratio	/:	Method)
Cauthy Dallas B	v/c	mph	sec	sec	ft	ft	sec	sec	%	% veh/mi	pc/mi	
South: Dallas B	oulevaru											
This approach of	does not h	ave any c	ontinuo	ıs lanes								
East: SR 528 W	/B Off-Ran	np										
This approach of	does not h	ave any c	ontinuo	ıs lanes								
North: Dallas B	oulevard											
Lane 2	0.404	39.8	0.1	5.43	316.8	17.4	0.69	4.74	5.5	12.7 16.7	16.9	LOS B

Midblock Effective Detection Zone Length = 7 ft

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MOVEMENT SUMMARY

♥ Site: 1 [Dallas Boulevard at SR 528 EB Ramps (Site Folder:

2050 PM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2050 PM Build Site Category: (None)

Roundabout

Vehi	cle Mo	ovemen	t Perfoi	rmance										
Mov ID	Turn	INP VOLU	MES	DEM/ FLO	WS	Deg. Satn		Level of Service	QU	ACK OF EUE	Prop. I Que	Effective Stop		Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] ft		Rate	Cycles	mph
South	n: Dalla	as Boulev	ard											
8	T1	680	2.0	716	2.0	1.171	113.2	LOS F	58.1	1475.9	1.00	3.21	7.47	5.4
18	R2	100	2.0	105	2.0	1.171	113.2	LOS F	58.1	1475.9	1.00	3.21	7.47	10.0
Appro	oach	780	2.0	821	2.0	1.171	113.2	LOS F	58.1	1475.9	1.00	3.21	7.47	6.0
North	ı: Dalla	s Bouleva	ard											
7	L2	60	2.0	63	2.0	0.397	6.4	LOSA	0.0	0.0	0.00	0.00	0.00	36.8
4	T1	450	2.0	474	2.0	0.397	6.4	LOSA	0.0	0.0	0.00	0.00	0.00	34.4
Appro	oach	510	2.0	537	2.0	0.397	6.4	LOSA	0.0	0.0	0.00	0.00	0.00	34.8
West	: SR 52	28 EB Off	f-Ramp											
5	L2	540	2.0	568	2.0	0.672	15.9	LOS C	7.1	180.5	0.80	1.05	1.47	22.3
12	R2	280	2.0	295	2.0	0.329	7.6	LOSA	1.5	37.7	0.57	0.54	0.57	30.5
Appro	oach	820	2.0	863	2.0	0.672	13.1	LOS B	7.1	180.5	0.72	0.87	1.17	24.7
All Vehic	eles	2110	2.0	2221	2.0	1.171	48.5	LOSE	58.1	1475.9	0.65	1.53	3.21	13.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▼ Site: 2 [Dallas Boulevard at SR 528 WB Ramps (Site Folder:

2050 PM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2050 PM Build Site Category: (None) Roundabout

Vehi	cle Mo	ovemen	t Perfor	mance										
Mov ID	Turn	INP VOLU	IMES	DEM, FLO	WS	Deg. Satn		Level of Service	QUE	ACK OF EUE	Prop. E Que	ffective Stop	Aver. No.	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] ft		Rate	Cycles	mph
South	n: Dalla	as Boulev	/ard											
3	L2	140	2.0	147	2.0	0.949	31.6	LOS D	0.0	0.0	0.00	0.00	0.00	36.8
8	T1	1080	2.0	1137	2.0	0.949	31.6	LOS D	0.0	0.0	0.00	0.00	0.00	34.4
Appro	oach	1220	2.0	1284	2.0	0.949	31.6	LOS D	0.0	0.0	0.00	0.00	0.00	34.9
East:	SR 52	8 WB Of	f-Ramp											
1	L2	230	2.0	242	2.0	0.573	22.2	LOS C	3.0	74.9	0.84	1.00	1.43	20.3
16	R2	100	2.0	105	2.0	0.217	10.6	LOS B	0.8	19.6	0.70	0.70	0.70	28.8
Appro	oach	330	2.0	347	2.0	0.573	18.7	LOS C	3.0	74.9	0.80	0.91	1.21	22.4
North	ı: Dalla	s Boulev	ard											
4	T1	280	2.0	295	2.0	0.304	6.8	LOSA	1.4	35.2	0.52	0.46	0.52	24.8
14	R2	250	2.0	263	2.0	0.160	0.0	LOSA	0.0	0.0	0.00	0.00	0.00	36.0
Appro	oach	530	2.0	558	2.0	0.304	3.6	LOSA	1.4	35.2	0.28	0.24	0.28	30.9
All Vehic	eles	2080	2.0	2189	2.0	0.949	22.4	LOS C	3.0	74.9	0.20	0.21	0.26	30.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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QUEUE ANALYSIS

orall Site: 1 [Dallas Boulevard at SR 528 EB Ramps (Site Folder: 2050 PM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2050 PM Build Site Category: (None) Roundabout

Lane Que	ues (Dis	stance))												
Lane Number	Contin. Lane	Deg. Satn (v/c	Prog. Factor Queue)	Overflow Queue (ft)	(of Queue (ft) 95%	Start of	f Green	Qu (1	verage eue t) 95%	Storag	eue e Ratio 95%	Prob. Block. \$		Ov. ₋ane No.
South: Dalla	as Boule				Av.	95%	Av.	95%	Av.	95%	Av.	95%	70	70	
Lane 1		1.171	1.000	469.5	593.8	1475.9	NA	NA	655.8	1189.7	0.90	2.24	39.9	NA	NA
Approach		1.171			593.8	1475.9	NA	NA	655.8	1189.7	0.90	2.24			
North: Dalla	as Boulev	/ard													
Lane 1		0.397	1.000	0.0	0.0	0.0	NA	NA	24.2	43.9	0.00	0.00	0.0	NA	NA
Approach		0.397			0.0	0.0	NA	NA	24.2	43.9	0.00	0.00			
West: SR 5	28 EB O	ff-Ramp													
Lane 1		0.672	1.000	24.9	72.6	180.5	NA	NA	63.7	115.5	0.05	0.12	0.0	NA	NA
Lane 2		0.329	1.000	0.0	15.2	37.7	NA	NA	15.8	28.7	0.02	0.05	0.0	NA	NA
Approach		0.672			72.6	180.5	NA	NA	63.7	115.5	0.05	0.12			
Intersection		1.171			593.8	1475.9	NA	NA	655.8	1189.7	0.90	2.24			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Lane Que	ues (Vel	hicles)													
Lane Number	Contin. Lane	Deg. Satn (Prog. Factor Queue)	Overflow Queue (veh)		f Queue eh)	Start o	ue at f Green eh)	. Qu	verage eue eh)		eue e Ratio	Block. S		Ov. Lane No.
		v/c			Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	
South: Dalla	as Boule	vard													
Lane 1		1.171	1.000	18.5	23.4	58.1	NA	NA	25.8	46.8	0.90	2.24	39.9	NA	NA
Approach		1.171			23.4	58.1	NA	NA	25.8	46.8	0.90	2.24			
North: Dalla	as Boulev	/ard													
Lane 1		0.397	1.000	0.0	0.0	0.0	NA	NA	1.0	1.7	0.00	0.00	0.0	NA	NA
Approach		0.397			0.0	0.0	NA	NA	1.0	1.7	0.00	0.00			
West: SR 5	28 EB O	ff-Ramp)												
Lane 1		0.672	1.000	1.0	2.9	7.1	NA	NA	2.5	4.5	0.05	0.12	0.0	NA	NA
Lane 2		0.329	1.000	0.0	0.6	1.5	NA	NA	0.6	1.1	0.02	0.05	0.0	NA	NA
Approach		0.672			2.9	7.1	NA	NA	2.5	4.5	0.05	0.12			
Intersection		1.171			23.4	58.1	NA	NA	25.8	46.8	0.90	2.24			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Continuous L	ane Pe	rforman	се								
Lane Number	Deg. Satn		Travel	Hdwy Spacing	Vehicle	Occup. Time		Occup.	Occup.	Density	LOS (Density
	v/c	mph	Delay sec	sec ft	Length ft	sec	sec	Ratio %	Ratio %	veh/mi pc/mi	Method)

South: Dallas Boulevard

This approach does not have any continuous lanes

North: Dallas Boulevard

This approach does not have any continuous lanes

West: SR 528 EB Off-Ramp

This approach does not have any continuous lanes

Midblock Effective Detection Zone Length = 7 ft

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QUEUE ANALYSIS

♥ Site: 2 [Dallas Boulevard at SR 528 WB Ramps (Site Folder:

2050 PM Build)]

SR 528 & Dallas Boulevard Interchange PD&E Study 2050 PM Build Site Category: (None) Roundabout

Lane Que	ues (Dis	stance)												
Lane Number	Contin. Lane		Prog. Factor Queue)	Overflow Queue (ft)		of Queue (ft)	Start o	f Green ft)	Qu (1	Average eue ft)	Storag	eue e Ratio	Block. S		Ov. Lane No.
		v/c			Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	
South: Dalla	as Boule	vard													
Lane 1		0.949	1.000	0.0	0.0	0.0	NA	NA	286.1	519.0	0.00	0.00	0.0	NA	NA
Approach		0.949			0.0	0.0	NA	NA	286.1	519.0	0.00	0.00			
East: SR 52	28 WB O	ff-Ramp)												
Lane 1		0.573	1.000	9.8	30.2	74.9	NA	NA	37.9	68.8	0.02	0.05	0.0	NA	NA
Lane 2		0.217	1.000	0.0	7.9	19.6	NA	NA	7.8	14.2	0.02	0.05	0.0	NA	NA
Approach		0.573			30.2	74.9	NA	NA	37.9	68.8	0.02	0.05			
North: Dalla	as Boule	/ard													
Lane 1		0.304	1.000	0.0	14.2	35.2	NA	NA	14.2	25.8	0.02	0.05	0.0	NA	NA
Lane 2	Υ	0.160	1.000	0.0	0.0	0.0	NA	NA	0.0	0.0	0.00	0.00	NA	0.0	1
Approach		0.304			14.2	35.2	NA	NA	14.2	25.8	0.02	0.05			
Intersection	1	0.949			30.2	74.9	NA	NA	286.1	519.0	0.02	0.05			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Lane Que	ues (Ve	hicles)													
Lane Number	Contin. Lane		Prog. Factor Queue)	Overflow Queue (veh)	()	of Queue veh)	Start o	f Green eh)	(ve	eue eh)	Storag	eue e Ratio	Block. S		Ov. Lane No.
South: Dall	as Boule	v/c vard			Av.	95%	Av.	95%	Av.	95%	Av.	95%	%	%	
Lane 1		0.949	1.000	0.0	0.0	0.0	NA	NA	11.3	20.4	0.00	0.00	0.0	NA	NA
Approach		0.949			0.0	0.0	NA	NA	11.3	20.4	0.00	0.00			
East: SR 52	28 WB O	ff-Ramp)												
Lane 1		0.573	1.000	0.4	1.2	3.0	NA	NA	1.5	2.7	0.02	0.05	0.0	NA	NA
Lane 2		0.217	1.000	0.0	0.3	8.0	NA	NA	0.3	0.6	0.02	0.05	0.0	NA	NA
Approach		0.573			1.2	3.0	NA	NA	1.5	2.7	0.02	0.05			
North: Dalla	as Boule	vard													
Lane 1		0.304	1.000	0.0	0.6	1.4	NA	NA	0.6	1.0	0.02	0.05	0.0	NA	NA
Lane 2	Υ	0.160	1.000	0.0	0.0	0.0	NA	NA	0.0	0.0	0.00	0.00	NA	0.0	1
Approach		0.304			0.6	1.4	NA	NA	0.6	1.0	0.02	0.05			
Intersection	ı	0.949			1.2	3.0	NA	NA	11.3	20.4	0.02	0.05			

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

Continuous L	ane Pe	rforman	се								
Lane Number	Deg.	Unint.	Unint.	Hdwy Spacing	Aver.	Occup.	Space	Space	Time	Density	LOS
	Satn	Speed	Travel		Vehicle	Time	Time	Occup.	Occup.		(Density

	/-		Delay			Length			Ratio	Ratio	, a la /saa;		Method)
South: Dallas B	v/c oulevard	mph	sec	sec	ft	ft	sec	sec	%	% V	eh/mi	pc/mi	
This approach of		ave anv c	ontinuo	us lanes									
тиз арргоаси (1003 1101 11	ave any c	Ontinuo	us laries									
East: SR 528 W	/B Off-Ran	np											
This approach of	does not h	ave any c	ontinuo	us lanes									
North: Dallas B	oulevard												
Lane 2	0.160	39.9	0.0	13.68	801.3	17.4	0.69	12.99	2.2	5.0	6.6	6.7	LOS A

Midblock Effective Detection Zone Length = 7 ft

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Project: C:\Users\torresreyesct\OneDrive - CDM Smith\Documents\Dallas Blvd\SIDRA\Interim\Roundabout 1-lane.sip9

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Lane Group	EBL	EBR	WBL	WBR2	NBL	NBT	NBR	SBL	SBT	SBR2	
Lane Configurations	ħ	7	7	7	7	f)		Ţ	†	7	
Traffic Volume (vph)	120	140	70	50	170	90	100	60	290	500	
Future Volume (vph)	120	140	70	50	170	90	100	60	290	500	
Satd. Flow (prot)	1770	1583	1770	1583	1770	1716	0	1770	1863	1583	
Flt Permitted	0.950		0.950		0.398			0.632			
Satd. Flow (perm)	1770	1583	1770	1583	741	1716	0	1177	1863	1583	
Satd. Flow (RTOR)		147		119		88				526	
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	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	
Parking (#/hr)											
Mid-Block Traffic (%)						0%			0%		
Shared Lane Traffic (%)											
Lane Group Flow (vph)	126	147	74	53	179	200	0	63	305	526	
Turn Type	Prot	Perm	Prot	Perm	pm+pt	NA		pm+pt	NA	Perm	
Protected Phases	4		8		5	2		1	6		
Permitted Phases		4		8	2			6		6	
Total Split (s)	24.0	24.0	24.0	24.0	21.0	51.0		15.0	45.0	45.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.4	6.4		6.4	6.4	6.4	
Act Effct Green (s)	9.9	9.9	9.9	9.9	30.5	24.3		23.8	15.6	15.6	
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.55	0.44		0.43	0.28	0.28	
v/c Ratio	0.40	0.37	0.24	0.14	0.30	0.25		0.11	0.59	0.64	
Control Delay	26.6	8.0	23.9	0.8	7.0	8.5		6.5	22.7	6.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Delay	26.6	8.0	23.9	0.8	7.0	8.5		6.5	22.7	6.0	
LOS	С	Α	С	Α	Α	Α		Α	С	Α	
Approach Delay						7.8			11.7		
Approach LOS						Α			В		

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 55.7

Control Type: Actuated-Uncoordinated

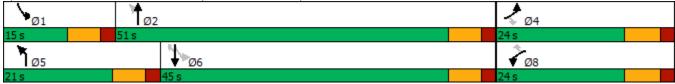
Maximum v/c Ratio: 0.64

Intersection Signal Delay: 11.8
Intersection Capacity Utilization 51.0%

Intersection LOS: B
ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: SR 528 EB Ramps/SR 528 WB Ramps & Dallas Boulevard



Synchro 11 Report Page 1

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	10	10	20	230	10	10	10	130	120	10	600	10
Future Volume (vph)	10	10	20	230	10	10	10	130	120	10	600	10
Satd. Flow (prot)	0	1717	0	0	1770	0	0	1744	0	0	1857	0
Flt Permitted		0.987			0.956			0.998			0.999	
Satd. Flow (perm)	0	1717	0	0	1770	0	0	1744	0	0	1857	0
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%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	0	0	264	0	0	274	0	0	654	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Control Type: Unsignalized Intersection Capacity Utilization 63.2%

ICU Level of Service B

Analysis Period (min) 15

Synchro 11 Report Page 2

Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	6:30	6:30	6:30	6:30	6:30	6:30	6:30
End Time	9:00	9:00	9:00	9:00	9:00	9:00	9:00
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	3319	3316	3316	3258	3248	3253	3232
Vehs Exited	3327	3303	3318	3243	3250	3257	3240
Starting Vehs	59	43	51	44	44	40	53
Ending Vehs	51	56	49	59	42	36	45
Travel Distance (mi)	2663	2676	2682	2621	2623	2618	2602
Travel Time (hr)	91.9	92.9	92.7	89.5	90.6	90.3	89.0
Total Delay (hr)	22.8	23.5	23.1	21.6	22.6	22.5	21.5
Total Stops	3600	3576	3559	3431	3521	3520	3492
Fuel Used (gal)	112.4	114.1	112.6	111.1	110.2	110.5	110.2

Summary of All Intervals

Run Number	8	9	10	Avg
Start Time	6:30	6:30	6:30	6:30
End Time	9:00	9:00	9:00	9:00
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	3319	3230	3414	3290
Vehs Exited	3323	3230	3407	3289
Starting Vehs	49	40	49	43
Ending Vehs	45	40	56	47
Travel Distance (mi)	2680	2615	2754	2653
Travel Time (hr)	92.5	88.9	94.7	91.3
Total Delay (hr)	23.0	21.3	23.4	22.5
Total Stops	3590	3413	3695	3538
Fuel Used (gal)	113.0	110.8	116.3	112.1

Interval #0 Information Seeding

Start Time	6:30
Start Time	0.50
End Time	7:00
Total Time (min)	30
` '	
Volumes adjusted by Grow	th Factors.
No data recorded this inter-	
No data recorded this inter-	vai.

Interval #1	Information	Recording
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Start Time	7:00		
End Time	9:00		
Total Time (min)	120		
Volumes adjusted by Grov	wth Factors.		

Run Number	1	2	3	4	5	6	7
Vehs Entered	3319	3316	3316	3258	3248	3253	3232
Vehs Exited	3327	3303	3318	3243	3250	3257	3240
Starting Vehs	59	43	51	44	44	40	53
Ending Vehs	51	56	49	59	42	36	45
Travel Distance (mi)	2663	2676	2682	2621	2623	2618	2602
Travel Time (hr)	91.9	92.9	92.7	89.5	90.6	90.3	89.0
Total Delay (hr)	22.8	23.5	23.1	21.6	22.6	22.5	21.5
Total Stops	3600	3576	3559	3431	3521	3520	3492
Fuel Used (gal)	112.4	114.1	112.6	111.1	110.2	110.5	110.2

Interval #1 Information Recording

Start Time	7:00	
End Time	9:00	
Total Time (min)	120	
Volumes adjusted by	Growth Factors.	

Run Number	8	9	10	Avg	
Vehs Entered	3319	3230	3414	3290	
Vehs Exited	3323	3230	3407	3289	
Starting Vehs	49	40	49	43	
Ending Vehs	45	40	56	47	
Travel Distance (mi)	2680	2615	2754	2653	
Travel Time (hr)	92.5	88.9	94.7	91.3	
Total Delay (hr)	23.0	21.3	23.4	22.5	
Total Stops	3590	3413	3695	3538	
Fuel Used (gal)	113.0	110.8	116.3	112.1	

Intersection: 1: SR 528 EB Ramps/SR 528 WB Ramps & Dallas Boulevard

Movement	EB	EB	WB	WB	NB	NB	SB	SB	
Directions Served	L	R	L	>	L	TR	L	Т	
Maximum Queue (ft)	127	61	92	6	117	125	60	172	
Average Queue (ft)	47	5	34	0	48	35	22	77	
95th Queue (ft)	91	30	71	4	86	85	48	132	
Link Distance (ft)	1856		1266			1210		947	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		700		375	350		400		
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 2: Starry Street & Dallas Boulevard

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	56	137	91	334
Average Queue (ft)	24	57	48	131
95th Queue (ft)	48	94	74	239
Link Distance (ft)	965	975	947	1246
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

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Lane Group	EBL	EBR	WBL	WBR2	NBL	NBT	NBR	SBL	SBT	SBR2	
Lane Configurations	*	7	7	7	ሻ	f)		7	^	7	
Traffic Volume (vph)	400	160	110	70	70	140	60	40	120	190	
Future Volume (vph)	400	160	110	70	70	140	60	40	120	190	
Satd. Flow (prot)	1770	1583	1770	1583	1770	1779	0	1770	1863	1583	
Flt Permitted	0.950		0.950		0.603			0.626			
Satd. Flow (perm)	1770	1583	1770	1583	1123	1779	0	1166	1863	1583	
Satd. Flow (RTOR)		168		119		26				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	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	
Parking (#/hr)											
Mid-Block Traffic (%)						0%			0%		
Shared Lane Traffic (%)											
Lane Group Flow (vph)	421	168	116	74	74	210	0	42	126	200	
Turn Type	Prot	Perm	Prot	Perm	pm+pt	NA		pm+pt	NA	Perm	
Protected Phases	4		8		5	2		1	6		
Permitted Phases		4		8	2			6		6	
Total Split (s)	36.0	36.0	36.0	36.0	18.0	37.0		17.0	36.0	36.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.4	6.4		6.4	6.4	6.4	
Act Effct Green (s)	19.3	19.3	19.3	19.3	18.2	15.6		16.6	12.6	12.6	
Actuated g/C Ratio	0.36	0.36	0.36	0.36	0.34	0.29		0.31	0.23	0.23	
v/c Ratio	0.66	0.25	0.18	0.12	0.15	0.39		0.09	0.29	0.38	
Control Delay	21.8	4.0	14.6	1.6	12.5	19.4		12.2	23.6	6.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Delay	21.8	4.0	14.6	1.6	12.5	19.4		12.2	23.6	6.7	
LOS	С	Α	В	Α	В	В		В	С	Α	
Approach Delay						17.6			13.1		
Approach LOS						В			В		

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 53.8

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 15.0 Intersection LOS: B
Intersection Capacity Utilization 56.2% ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: SR 528 EB Ramps/SR 528 WB Ramps & Dallas Boulevard



Synchro 11 Report Page 6

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	10	10	20	100	10	10	20	380	210	10	230	10
Future Volume (vph)	10	10	20	100	10	10	20	380	210	10	230	10
Satd. Flow (prot)	0	1717	0	0	1767	0	0	1774	0	0	1848	0
Flt Permitted		0.987			0.960			0.998			0.998	
Satd. Flow (perm)	0	1717	0	0	1767	0	0	1774	0	0	1848	0
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%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	0	0	127	0	0	642	0	0	264	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Control Type: Unsignalized Intersection Capacity Utilization 60.7%

ICU Level of Service B

Analysis Period (min) 15

Synchro 11 Report Page 7

Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	4:30	4:30	4:30	4:30	4:30	4:30	4:30
End Time	7:00	7:00	7:00	7:00	7:00	7:00	7:00
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	2860	2833	2865	2723	2729	2910	2892
Vehs Exited	2865	2834	2852	2720	2753	2886	2894
Starting Vehs	41	39	42	38	60	26	39
Ending Vehs	36	38	55	41	36	50	37
Travel Distance (mi)	2343	2318	2335	2227	2232	2367	2364
Travel Time (hr)	81.5	79.3	80.2	75.4	75.4	81.2	81.4
Total Delay (hr)	21.0	19.6	20.0	18.0	17.9	20.2	20.2
Total Stops	3492	3428	3479	3268	3244	3480	3503
Fuel Used (gal)	91.1	90.7	89.4	87.1	86.7	92.0	91.3

Summary of All Intervals

Run Number	8	9	10	Avg
Start Time	4:30	4:30	4:30	4:30
End Time	7:00	7:00	7:00	7:00
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	2912	2798	2863	2839
Vehs Exited	2904	2802	2848	2837
Starting Vehs	44	37	35	38
Ending Vehs	52	33	50	43
Travel Distance (mi)	2389	2284	2340	2320
Travel Time (hr)	82.6	77.9	79.6	79.4
Total Delay (hr)	20.9	18.9	19.5	19.6
Total Stops	3485	3420	3406	3420
Fuel Used (gal)	91.3	87.8	91.8	89.9

Interval #0 Information Seeding

Start Time	4:30
End Time	5:00
Total Time (min)	30
Volumes adjusted by Grow	th Factors.
No data recorded this inter-	val.

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Start Time	5:00	
End Time	7:00	
Total Time (min)	120	
Volumes adjusted by Gr	owth Factors.	

Run Number	1	2	3	4	5	6	7
Vehs Entered	2860	2833	2865	2723	2729	2910	2892
Vehs Exited	2865	2834	2852	2720	2753	2886	2894
Starting Vehs	41	39	42	38	60	26	39
Ending Vehs	36	38	55	41	36	50	37
Travel Distance (mi)	2343	2318	2335	2227	2232	2367	2364
Travel Time (hr)	81.5	79.3	80.2	75.4	75.4	81.2	81.4
Total Delay (hr)	21.0	19.6	20.0	18.0	17.9	20.2	20.2
Total Stops	3492	3428	3479	3268	3244	3480	3503
Fuel Used (gal)	91.1	90.7	89.4	87.1	86.7	92.0	91.3

Interval #1 Information Recording

Start Time	5:00	
End Time	7:00	
Total Time (min)	120	
Volumes adjusted by 0	Growth Factors.	

Run Number	8	9	10	Avg	
Vehs Entered	2912	2798	2863	2839	
Vehs Exited	2904	2802	2848	2837	
Starting Vehs	44	37	35	38	
Ending Vehs	52	33	50	43	
Travel Distance (mi)	2389	2284	2340	2320	
Travel Time (hr)	82.6	77.9	79.6	79.4	
Total Delay (hr)	20.9	18.9	19.5	19.6	
Total Stops	3485	3420	3406	3420	
Fuel Used (gal)	91.3	87.8	91.8	89.9	

Intersection: 1: SR 528 EB Ramps/SR 528 WB Ramps & Dallas Boulevard

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	R	L	>	L	TR	L	T
Maximum Queue (ft)	248	58	111	83	80	149	63	108
Average Queue (ft)	120	5	41	2	29	60	20	41
95th Queue (ft)	196	29	81	25	60	115	47	81
Link Distance (ft)	1856		1266			1210		947
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		700		375	350		400	
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 2: Starry Street & Dallas Boulevard

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	47	71	226	108
Average Queue (ft)	22	39	98	49
95th Queue (ft)	46	61	164	77
Link Distance (ft)	965	975	947	1246
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

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Lane Group	EBL	EBR	WBL	WBR2	NBL	NBT	NBR	SBL	SBT	SBR2	
Lane Configurations	*	7	*	7	*	ĵ»		¥		7	
Traffic Volume (vph)	150	240	110	50	270	240	200	130	540	630	
Future Volume (vph)	150	240	110	50	270	240	200	130	540	630	
Satd. Flow (prot)	1770	1583	1770	1583	1770	1736	0	1770	1863	1583	
Flt Permitted	0.950		0.950		0.195			0.490			
Satd. Flow (perm)	1770	1583	1770	1583	363	1736	0	913	1863	1583	
Satd. Flow (RTOR)		253		119		66				663	
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	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	
Parking (#/hr)											
Mid-Block Traffic (%)						0%			0%		
Shared Lane Traffic (%)											
Lane Group Flow (vph)	158	253	116	53	284	464	0	137	568	663	
Turn Type	Prot	Perm	Prot	Perm	pm+pt	NA		pm+pt	NA	Perm	
Protected Phases	4		8		5	2		1	6		
Permitted Phases		4		8	2			6		6	
Total Split (s)	24.0	24.0	24.0	24.0	21.0	51.0		15.0	45.0	45.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.4	6.4		6.4	6.4	6.4	
Act Effct Green (s)	12.1	12.1	12.1	12.1	46.2	36.1		36.4	27.9	27.9	
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.63	0.49		0.50	0.38	0.38	
v/c Ratio	0.54	0.53	0.40	0.15	0.60	0.52		0.25	0.80	0.65	
Control Delay	37.8	9.1	34.4	0.9	12.6	14.4		7.3	29.7	4.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Delay	37.8	9.1	34.4	0.9	12.6	14.4		7.3	29.7	4.9	
LOS	D	Α	С	Α	В	В		Α	С	Α	
Approach Delay						13.7			15.5		
Approach LOS						В			В		

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 73.1

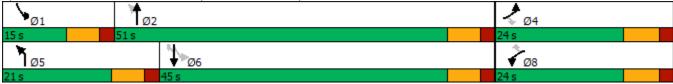
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 16.2 Intersection LOS: B
Intersection Capacity Utilization 68.0% ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: SR 528 EB Ramps/SR 528 WB Ramps & Dallas Boulevard



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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	20	20	30	420	20	20	30	200	210	20	850	20
Future Volume (vph)	20	20	30	420	20	20	30	200	210	20	850	20
Satd. Flow (prot)	0	1730	0	0	1770	0	0	1738	0	0	1855	0
Flt Permitted		0.986			0.956			0.910			0.985	
Satd. Flow (perm)	0	1730	0	0	1770	0	0	1587	0	0	1829	0
Satd. Flow (RTOR)		32			2			74			2	
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%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	74	0	0	484	0	0	464	0	0	937	0
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2			6		
Total Split (s)	14.0	14.0		24.0	24.0		52.0	52.0		52.0	52.0	
Total Lost Time (s)		5.7			5.7			6.4			6.4	
Act Effct Green (s)		8.2			18.4			45.8			45.8	
Actuated g/C Ratio		0.09			0.21			0.53			0.53	
v/c Ratio		0.39			1.29			0.53			0.97	
Control Delay		31.2			181.9			14.8			46.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		31.2			181.9			14.8			46.2	
LOS		С			F			В			D	
Approach Delay		31.2			181.9			14.8			46.2	
Approach LOS		С			F			В			D	
Intersection Summary												

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 87.1

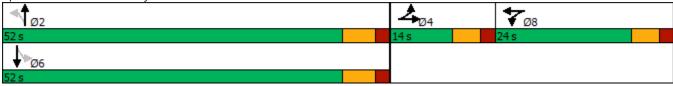
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.29

Intersection Signal Delay: 71.7 Intersection Capacity Utilization 93.6% Intersection LOS: E ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Starry Street & Dallas Boulevard



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Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	6:30	6:30	6:30	6:30	6:30	6:30	6:30
End Time	9:00	9:00	9:00	9:00	9:00	9:00	9:00
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	5139	5143	5203	5124	5211	5251	5225
Vehs Exited	5164	5138	5163	5142	5191	5202	5244
Starting Vehs	161	150	118	166	125	102	173
Ending Vehs	136	155	158	148	145	151	154
Travel Distance (mi)	4023	4002	4041	4011	4059	4089	4092
Travel Time (hr)	602.5	742.9	384.6	438.0	497.6	509.3	517.7
Total Delay (hr)	498.0	639.0	279.9	334.1	392.4	403.0	411.7
Total Stops	5954	5982	5737	6370	6151	5908	6506
Fuel Used (gal)	273.8	304.3	222.7	236.1	250.3	252.9	256.0

Summary of All Intervals

Run Number	8	9	10	Avg	
Start Time	6:30	6:30	6:30	6:30	
End Time	9:00	9:00	9:00	9:00	
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	5155	5214	5220	5187	
Vehs Exited	5120	5219	5205	5179	
Starting Vehs	132	154	142	141	
Ending Vehs	167	149	157	153	
Travel Distance (mi)	4014	4080	4074	4048	
Travel Time (hr)	513.7	339.2	583.6	512.9	
Total Delay (hr)	409.7	233.4	478.1	407.9	
Total Stops	6369	6391	6228	6158	
Fuel Used (gal)	252.5	214.8	271.8	253.5	

Interval #0 Information Seeding

Start Time	6:30
End Time	7:00
Total Time (min)	30
Volumes adjusted by Grow	wth Factors.
No data recorded this inter	rval.

Interval #1	Information	Recording
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Start Time	7:00	
End Time	9:00	
Total Time (min)	120	
Volumes adjusted by Gro	wth Factors.	

Run Number	1	2	3	4	5	6	7
Vehs Entered	5139	5143	5203	5124	5211	5251	5225
Vehs Exited	5164	5138	5163	5142	5191	5202	5244
Starting Vehs	161	150	118	166	125	102	173
Ending Vehs	136	155	158	148	145	151	154
Travel Distance (mi)	4023	4002	4041	4011	4059	4089	4092
Travel Time (hr)	602.5	742.9	384.6	438.0	497.6	509.3	517.7
Total Delay (hr)	498.0	639.0	279.9	334.1	392.4	403.0	411.7
Total Stops	5954	5982	5737	6370	6151	5908	6506
Fuel Used (gal)	273.8	304.3	222.7	236.1	250.3	252.9	256.0

Interval #1 Information Recording

Start Time	7:00	
End Time	9:00	
Total Time (min)	120	
Volumes adjusted b	by Growth Factors.	

Run Number	8	9	10	Avg	
Vehs Entered	5155	5214	5220	5187	
Vehs Exited	5120	5219	5205	5179	
Starting Vehs	132	154	142	141	
Ending Vehs	167	149	157	153	
Travel Distance (mi)	4014	4080	4074	4048	
Travel Time (hr)	513.7	339.2	583.6	512.9	
Total Delay (hr)	409.7	233.4	478.1	407.9	
Total Stops	6369	6391	6228	6158	
Fuel Used (gal)	252.5	214.8	271.8	253.5	

Intersection: 1: SR 528 EB Ramps/SR 528 WB Ramps & Dallas Boulevard

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	R	L	>	L	TR	L	T
Maximum Queue (ft)	210	136	142	22	246	438	118	289
Average Queue (ft)	77	41	58	0	90	134	43	160
95th Queue (ft)	148	100	107	9	171	293	82	257
Link Distance (ft)	1856		1266			1210		947
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		700		375	350		400	
Storage Blk Time (%)						1		
Queuing Penalty (veh)						2		

Intersection: 2: Starry Street & Dallas Boulevard

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	124	1035	795	1304
Average Queue (ft)	48	994	293	1102
95th Queue (ft)	94	1024	665	1624
Link Distance (ft)	965	975	947	1246
Upstream Blk Time (%)		96	1	56
Queuing Penalty (veh)		0	4	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 7

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Lane Group	EBL	EBR	WBL	WBR2	NBL	NBT	NBR	SBL	SBT	SBR2	
Lane Configurations	*	7	*	7	7	ĵ.		7		7	
Traffic Volume (vph)	540	280	230	100	140	540	100	60	220	250	
Future Volume (vph)	540	280	230	100	140	540	100	60	220	250	
Satd. Flow (prot)	1770	1583	1770	1583	1770	1820	0	1770	1863	1583	
Flt Permitted	0.950		0.950		0.506			0.145			
Satd. Flow (perm)	1770	1583	1770	1583	943	1820	0	270	1863	1583	
Satd. Flow (RTOR)		295		119		11				263	
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	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	
Parking (#/hr)											
Mid-Block Traffic (%)						0%			0%		
Shared Lane Traffic (%)											
Lane Group Flow (vph)	568	295	242	105	147	673	0	63	232	263	
Turn Type	Prot	Perm	Prot	Perm	pm+pt	NA		pm+pt	NA	Perm	
Protected Phases	4		8		5	2		1	6		
Permitted Phases		4		8	2			6		6	
Total Split (s)	36.0	36.0	36.0	36.0	18.0	37.0		17.0	36.0	36.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.4	6.4		6.4	6.4	6.4	
Act Effct Green (s)	29.3	29.3	29.3	29.3	38.4	30.8		34.3	26.1	26.1	
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.45	0.36		0.41	0.31	0.31	
v/c Ratio	0.93	0.40	0.40	0.17	0.28	1.01		0.25	0.40	0.39	
Control Delay	52.0	4.5	24.4	4.2	13.0	66.0		13.8	25.5	5.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	
Total Delay	52.0	4.5	24.4	4.2	13.0	66.0		13.8	25.5	5.0	
LOS	D	Α	С	Α	В	Е		В	С	Α	
Approach Delay						56.5			14.5		
Approach LOS						Е			В		
Intersection Cummery											

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 84.6

Control Type: Actuated-Uncoordinated

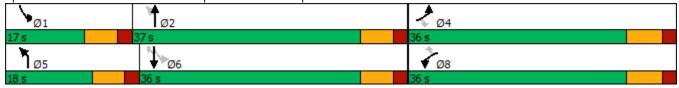
Maximum v/c Ratio: 1.01

Intersection Signal Delay: 35.4
Intersection Capacity Utilization 87.4%

Intersection LOS: D
ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: SR 528 EB Ramps/SR 528 WB Ramps & Dallas Boulevard



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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	20	20	30	190	20	20	50	700	430	20	310	20
Future Volume (vph)	20	20	30	190	20	20	50	700	430	20	310	20
Satd. Flow (prot)	0	1730	0	0	1767	0	0	1768	0	0	1842	0
Flt Permitted		0.986			0.960			0.968			0.910	
Satd. Flow (perm)	0	1730	0	0	1767	0	0	1715	0	0	1682	0
Satd. Flow (RTOR)		32			5			45			5	
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%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	74	0	0	242	0	0	1243	0	0	368	0
Turn Type	Split	NA		Split	NA		Perm	NA		Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2			6		
Total Split (s)	17.0	17.0		22.0	22.0		51.0	51.0		51.0	51.0	
Total Lost Time (s)		5.7			5.7			6.4			6.4	
Act Effct Green (s)		8.9			14.7			45.8			45.8	
Actuated g/C Ratio		0.11			0.18			0.55			0.55	
v/c Ratio		0.35			0.78			1.30			0.40	
Control Delay		28.4			51.2			165.6			14.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		28.4			51.2			165.6			14.3	
LOS		С			D			F			В	
Approach Delay		28.4			51.2			165.6			14.3	
Approach LOS		С			D			F			В	
Latana antina Camana												

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 84

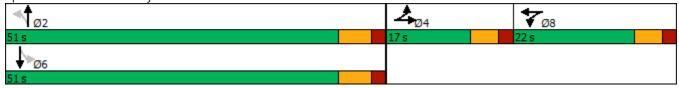
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.30

Intersection Signal Delay: 117.1 Intersection Capacity Utilization 108.8% Intersection LOS: F
ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 2: Starry Street & Dallas Boulevard



Synchro 11 Report Page 17

Summary of All Intervals

Run Number	1	2	3	4	5	6	7
Start Time	4:30	4:30	4:30	4:30	4:30	4:30	4:30
End Time	7:00	7:00	7:00	7:00	7:00	7:00	7:00
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	4277	4316	4389	4381	4330	4449	4273
Vehs Exited	4299	4329	4333	4309	4312	4409	4273
Starting Vehs	248	240	168	164	211	184	246
Ending Vehs	226	227	224	236	229	224	246
Travel Distance (mi)	3350	3390	3395	3362	3350	3459	3355
Travel Time (hr)	1497.5	1546.4	965.2	1083.2	1172.3	1228.2	1582.2
Total Delay (hr)	1410.7	1458.5	877.4	996.2	1085.1	1138.3	1495.1
Total Stops	6569	6955	7285	7260	7001	6997	6608
Fuel Used (gal)	442.4	454.1	321.2	347.6	367.5	383.4	461.6

Summary of All Intervals

Run Number	8	9	10	Avg	
Start Time	4:30	4:30	4:30	4:30	
End Time	7:00	7:00	7:00	7:00	
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	4301	4232	4404	4336	
Vehs Exited	4248	4167	4374	4304	
Starting Vehs	188	200	204	203	
Ending Vehs	241	265	234	234	
Travel Distance (mi)	3325	3271	3423	3368	
Travel Time (hr)	1469.4	1560.4	1230.6	1333.5	
Total Delay (hr)	1383.0	1475.7	1141.7	1246.2	
Total Stops	7014	6527	6911	6912	
Fuel Used (gal)	435.3	454.8	384.1	405.2	

Interval #0 Information Seeding

a =:	
Start Time	4:30
End Time	5:00
Total Time (min)	30
Volumes adjusted by Grow	vth Factors.
No data recorded this inter	val.

Interval #1	Info	ormation	Reco	rdina
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Start Time	5:00	
End Time	7:00	
Total Time (min)	120	
Volumes adjusted by Gro	wth Factors.	

Run Number	1	2	3	4	5	6	7
Vehs Entered	4277	4316	4389	4381	4330	4449	4273
Vehs Exited	4299	4329	4333	4309	4312	4409	4273
Starting Vehs	248	240	168	164	211	184	246
Ending Vehs	226	227	224	236	229	224	246
Travel Distance (mi)	3350	3390	3395	3362	3350	3459	3355
Travel Time (hr)	1497.5	1546.4	965.2	1083.2	1172.3	1228.2	1582.2
Total Delay (hr)	1410.7	1458.5	877.4	996.2	1085.1	1138.3	1495.1
Total Stops	6569	6955	7285	7260	7001	6997	6608
Fuel Used (gal)	442.4	454.1	321.2	347.6	367.5	383.4	461.6

Interval #1 Information Recording

Start Time	5:00	
End Time	7:00	
Total Time (min)	120	
Volumes adjusted b	y Growth Factors.	

Run Number	8	9	10	Avg	
Vehs Entered	4301	4232	4404	4336	
Vehs Exited	4248	4167	4374	4304	
Starting Vehs	188	200	204	203	
Ending Vehs	241	265	234	234	
Travel Distance (mi)	3325	3271	3423	3368	
Travel Time (hr)	1469.4	1560.4	1230.6	1333.5	
Total Delay (hr)	1383.0	1475.7	1141.7	1246.2	
Total Stops	7014	6527	6911	6912	
Fuel Used (gal)	435.3	454.8	384.1	405.2	

Intersection: 1: SR 528 EB Ramps/SR 528 WB Ramps & Dallas Boulevard

Movement	EB	EB	WB	WB	NB	NB	SB	SB	
Directions Served	L	R	L	>	L	TR	L	T	
Maximum Queue (ft)	1872	800	211	120	400	1270	100	243	
Average Queue (ft)	1823	775	98	11	335	1232	32	90	
95th Queue (ft)	2134	1000	166	57	564	1253	68	178	
Link Distance (ft)	1856		1266			1210		947	
Upstream Blk Time (%)	32					96			
Queuing Penalty (veh)	263					0			
Storage Bay Dist (ft)		700		375	350		400		
Storage Blk Time (%)	93				0	82			
Queuing Penalty (veh)	261				0	115			

Intersection: 2: Starry Street & Dallas Boulevard

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	122	250	1023	734
Average Queue (ft)	45	127	955	214
95th Queue (ft)	85	209	1048	507
Link Distance (ft)	965	975	947	1246
Upstream Blk Time (%)			12	
Queuing Penalty (veh)			141	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 781