

# **ACCESS JUSTIFICATION REPORT**

I-35\_I-240 INTERCHANGE OKLAHOMA COUNTY

July 2015

Prepared by





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### I-35\_I-240 INTERCHANGE

Oklahoma City, Oklahoma County

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#### **EXECUTIVE SUMMARY**

Section 111 of Title 23, United States Code (23 USC 111) requires that proposed new or revised Interstate access to be approved by the Federal Highway Administration (FHWA) before such access modifications can be made. FHWA's interest is to maintain and provide the highest level of service in terms of safety and mobility. Adequate control of access is critical to providing safety and proper level of traffic operation on the Interstate Highway System, therefore; FHWA national policy has instituted rules and regulations guiding any new access points or proposed changes to existing access points on the Interstate Highway System to meet the eight (8) requirements published in their policy.

The access justification requested is the revision of the existing Interstate Highways 35 and 240 interchange in Oklahoma City, OK. This is an old interchange with outdated design, lack of proper acceleration and deceleration lanes, exit and entrance loop ramps with tight radii. During the past decade, this interchange has experienced substantial traffic growth due to the continuous developments in this area. The traffic growth and design deficiencies have all contributed to the problems that this interchange has been experiencing in recent years.

A team comprised of representatives from Oklahoma Department of Transportation (ODOT), FHWA, the City of Oklahoma City, Oklahoma City Metropolitan Planning Organization, and consulting engineers studied the interchange area. Data were supplied by ODOT and traffic forecasts were prepared using the regional travel demand model (City/MPO). Interchange alternatives were developed and evaluated with public input provided at public meetings and through comments received via mail services.

An Environmental Assessment (EA) for this interchange has been prepared. Alternatives have been screened out through the environmental process and the preferred alternative has been identified by the EA. The Interstate access analysis showed that a three (3) level partial cloverleaf system interchange configuration would best meet the purpose and need for an updated interchange at this location. All eight policy requirements for revised Interstate access are satisfied and are detailed in this report.

The exact project schedule has not been established. For the analysis in this report, the "Opening Day" for the proposed interchange is set for year 2020, and the design year is set for year 2040.





INTRODUCTION

# This Interchange Access Justification Report (AJR) documents a request to FHWA for an access revision to I-35 and I-240 interchange in Oklahoma County. The AJR has been prepared in accordance with criteria outlined in the Federal Register of February 11, 1998,

and addresses all the requirements.

I-35 traverses Oklahoma from north to south connecting the Kansas City (Missouri), Wichita (Kansas), Oklahoma City (Oklahoma), and Dallas/Fort Worth (Texas) metropolitan areas. Within Oklahoma County, I-35 serves not only the long-distance national traffic, but also the commuters from the greater Oklahoma City area and the regional freight movements. The existing urbanized full cloverleaf system interchange that connects the two high volume Interstate Highways 35 and 240 in Oklahoma City, Oklahoma County, is an old interchange with outdated design. The interchange is also known as the Crossroads Interchange, due to the adjacent Crossroads Mall located in the northeast quadrant. Heavy traffic volumes, inadequate interchange design (lack of proper acceleration and deceleration lanes, exit and entrance loop ramps with tight radii) have contributed to the problems that this interchange has been experiencing in recent years.

The Oklahoma Department of Transportation (ODOT) has been studying and evaluating this interchange since 1988. Operational and safety improvements, economic developments, environment impacts, highway project-management, public involvement, costs impacts on institutions that provide ancillary services to highways,...etc., have all been considered in developing alternative configuration alignments for this interchange and all are noted on the National Environmental Policy Act (NEPA) documents.

The preferred interchange configuration for this location is a three (3) level partial cloverleaf system interchange. All entrance and exit ramps are designed on the right side of the highway. The interchange maintains single exit with the exception of eastbound I-240 where two (2) exits are needed to provide for the northbound and southbound I-35 movements. The two (2) loop ramps in the NW and SE quadrants provide the westbound I-240 to southbound I-35 and the eastbound I-240 to northbound I-35 connections, respectively. The two (2) directional flyovers provide the northbound I-35 to westbound I-240 and the southbound I-35 to eastbound I-240 movements. The other four (4) basic interchange movements are through directional ramps.

The Interstate Highway 35 mainline consists of six (6) basic lanes and it is already constructed on its present alignment. The Interstate Highway 240 with six (6) basic lanes





will be reconstructed on a partially new alignment which is shifted south where it crosses I-35 to provide more space on the heavily developed northeast quadrant of the interchange.

The proposed interchange configuration will provide the eight (8) primary basic movements according to the American Association of State Highway and Transportation Officials (AASHTO) Design Standards Interstate System, which is essential to a system interchange. All the entrance/exit ramps are properly designed to provide safe and acceptable merge and diverge. The proposed interchange design meets or exceeds the latest edition of AASHTO "A Policy on Geometric Design of Highways and Streets" guidelines and design criteria.

The intent of this report is to justify that the proposed improvements are truly needed for this location. The results of the traffic operational analyses on the existing facility are a good indication of the poor traffic operation of the interchange especially during the peak hours of operation. The existing accident rate throughout the interchange, which exceeds the current average accident rate for an urbanized full access control facility, is another indication of the problems that this interchange is experiencing. The new interchange configuration will provide acceptable safety and traffic operation.

The current total programmed estimated cost for the proposed improvements (Right-of-Way, Utilities, Design, Construction, and Traffic Control) is \$132,049,475.00.





**Requirement 1: EXISTING FACILITIES** 

"The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control,

modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands (23 CFR 625.2(a))."

The Interstate Highway 35 (I-35) and Interstate Highway 240 (I-240) in Oklahoma County are connected via a full cloverleaf system interchange. The interchange was designed and constructed in 1960s. The area surrounding the interchange has developed throughout the years. This location is one of the crowded urbanized area in Oklahoma City. High traffic volumes, inadequate interchange design, lack of proper acceleration and deceleration lanes, and loop ramps with small radii have all contributed to the problems that this interchange is currently experiencing. The existing project location is shown on Exhibit (1).

ODOT has studied and evaluated this interchange since 1988. Extensive traffic operational analyses have determined that the travel demands for the project area and the interchange in the future would be over capacity unless additional lanes were added to the existing facility. Additional lanes were recently constructed on I-35. The basic number of through lanes is three each direction. The area around the interchange and along I-35 towards Oklahoma City is very dense and saturated. The Department is well aware that the likelihood of additional lane or lanes on I-35 is very low due to the lack of right-of-way and high cost. The Department has also been evaluating other routes east and west of I-35 between the City of Norman and Oklahoma City to reduce traffic congestion on I-35 in this area.

The 24-hour raw traffic for the project area mainlines, interchange ramps and intersections were counted by ODOT in 2013. This raw traffic data was processed by ODOT to develop the 2013 balanced traffic data (the annual average daily traffic (AADT), morning and evening (AM-PM) peak hour traffic volumes along mainlines, ramps, and intersections) for the existing and proposed interchange configurations. The balanced 2013 traffic volumes were forecasted to the future 2040 design year for the existing and proposed interchange configurations based on the travel parameters (trip generation, trip distribution, mode choice, and traffic assignment), land use and future developments. The travel parameters data was obtained from the regional Metropolitan Planning Organizations (MPOs) and the Association of Central Oklahoma Governments (ACOG) serving Oklahoma City that account for future land use plans in the surrounding suburbs within the Oklahoma City Area Regional Transportation Study (OCARTS). The forecasted 2040 design year traffic volumes were adjusted to develop capacity restraint assignments in





order to approximate equilibrium solution by capturing the trip delay caused by flow congestion. The flow congestion of a route is determined by the route's operational flow volumes to capacity ratio (v/c) reflecting the route's performance, which is also described through notion of level of service in Highway Capacity Manual.

The existing 2013 AADT and the AM-PM peak hour traffic volumes, the forecasted capacity restrained 2040 AADT and the AM-PM peak hour traffic volumes, and their corresponding Annual Average Daily Truck Traffic (AADTT) and Truck Percentage of Design Hourly Volume (TDHV) for the existing interchange configuration for the mainlines and ramps are shown on Exhibits (2) through (4) respectively.

The latest version of the Highway Capacity Software (HCS 2010) was utilized for the freeway analysis. The HCS is approved by the FHWA as a guide for evaluating freeways (Capacity, Operation, and Planning). The capacity analysis provides the measures of the traffic volume that a given facility can accommodate. The intent of the analysis is to estimate the maximum amount of traffic that can be accommodated by a facility while maintaining desired operational qualities.

The quality of traffic operation or concept of level-of-service (LOS) is defined in the Highway Capacity Manual (HCM) as a qualitative measure which describes operational conditions in terms of such factors as vehicular speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, highway geometry, and safety. The qualitative traffic operation of a facility is measured by a set of six defined levels of service. These six levels of service are given letter designations from "A" to "F" with level of service "A" representing the best operating conditions (Free Flow, Open Space Movement) and "F" representing the worst operating conditions (Severe Congestion, Traffic Jam).

<u>Basic Freeway Segment</u> -- Highway Capacity Manual defines basic freeway segments as those freeway segments that are outside the influence of merging, diverging, or weaving maneuvers. A basic freeway segment can be characterized by three performance measures: density in passenger cars per mile per lane (pc/mi/ln), space mean speed in miles per hour (mi/h), and the ratio of demand flow rate to capacity (v/c). Because speed is constant through a broad range of flows and the v/c ratio is not directly discernible to road users (except at capacity), the service measure for basic freeway segment is density. Table (1) shows the LOS thresholds for basic freeway segments.





LOS	Density (pc/mi/ln)
A	≤11
В	> 11-18
С	> 18-26
D	> 26-35
Е	> 35-45
F	> 45

Table (1)

The HCM operational analysis does not accurately calculate the density and speed once freeway segment demand exceeds capacity and does not depict any values for them.

<u>Freeway Merge and Diverge Segments</u> – Freeway merge and diverge segments occur primarily at on-ramp and off-ramp junctions with the freeway mainline. They can also occur at major merge or diverge points where mainline roadways join or separate. Merge/diverge segment LOS is defined in terms of density for all cases of stable operation (LOS A-E). LOS F exists when the freeway demand exceeds the capacity of the upstream (diverges) or downstream (merges) freeway segment, or where the off-ramp demand exceeds the off-ramp capacity. LOS for merge and diverge areas is based on density (pc/mile/lane) within the merge or diverge influence areas. The LOS thresholds for merge and diverge areas are shown in Table (2).

LOS	Density (pc/mi/ln)	Comments	
A	≤ 10	Unrestricted operations	
В	> 10-20	Merging and diverging maneuvers noticeable to drivers	
С	> 20-28	Influence area speeds begin to decline	
D	> 28-35	Influence area turbulence becomes intrusive	
E	> 35	Turbulence felt by virtually all drivers	
F	Demand exceeds capacity	Ramp and freeway queues form	

Table (2)





<u>Freeway Weaving Segment</u> – Weaving is generally defined as the crossing of two or more traffic streams traveling in the same direction along a significant length of highway without the aid of traffic control devices (except for guide signs). Weaving segments are formed when merge segments are closely followed by diverge segments. "Closely" implies that there is not sufficient distance between the merge and diverge segments for them to operate independently. LOS in a weaving segment is related to the density (pc/mile/lane) in the segment. Table (3) provides LOS threshold criteria for weaving segments on freeway, collector-distributer (C-D) roadways, and multilane highways.

	Freeway Weaving Weaving Segments on Multilane	
LOS	Segments	Highways or C-D Roadways
	Density (pc/mi/ln)	
A	0-10	0-12
В	> 10-20	> 12-24
С	> 20-28	> 24-32
D	> 28-35	> 32-36
E	> 35	> 36
F	Demand exceeds capacity	

Table (3)

When a ramp junction or major merge/diverge area involves lane additions or lane drops at the junction, freeway capacity must be checked both immediately upstream and downstream of the ramp influence area. The capacity of the ramp roadway should always be checked against the demand flow rate on the ramp. Ramp-freeway junction capacity check (i.e., demand exceeds capacity: v/c is greater than 1.00) results in LOS F. Table (4) offers Capacity of Ramp Roadways (pc/h) based on ramp free flow speed.





Ramp FFS	Capacity of Ramp Roadway (pc)		
S <sub>fr</sub> (mi/h)	Single-Lane Ramps Two-Lane Ram		
> 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	

Table (4)

The results of HCS freeway analysis on the existing interchange configuration utilizing the 2013 and capacity restrained 2040 traffic volumes are shown on exhibits (5) and (6) respectively. These results are based on the following input assumptions that were consistent with the existing conditions,

<ul> <li>Peak Hour Factor (PHF)</li> </ul>	0.92
• Terrain	Level
• I-35, I-240 Free Flow Speed (FFS)	69.6 mph
<ul> <li>Directional Ramps Free Flow Speed</li> </ul>	45 mph
<ul> <li>Loop Ramps Free Flow Speed</li> </ul>	25 mph

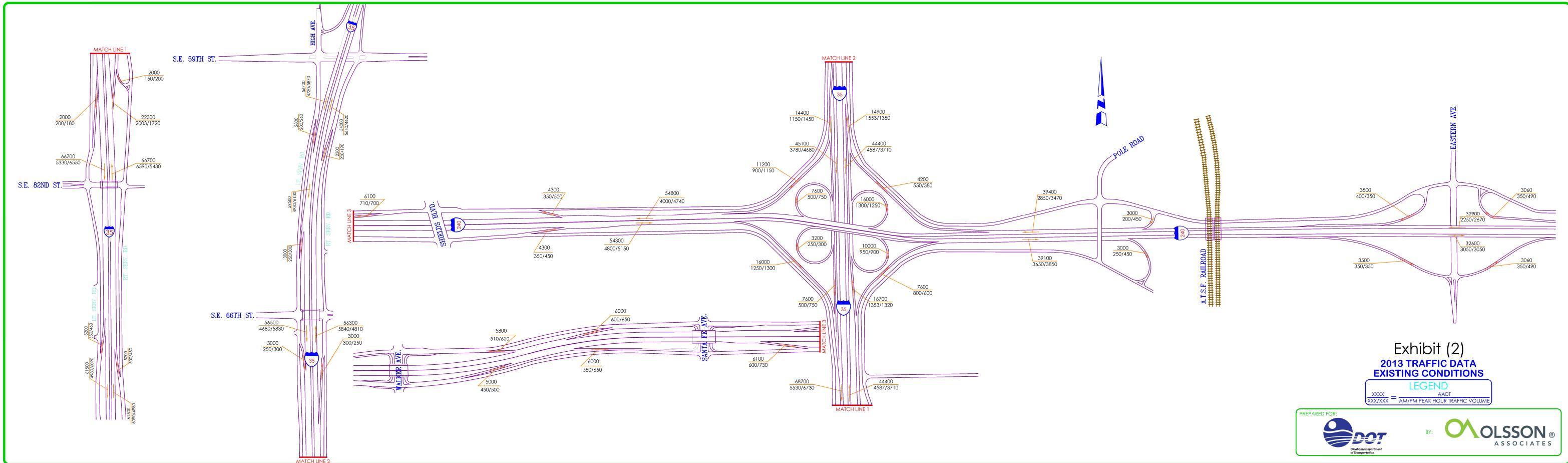
To simplify the comparison of the level-of-service analyses for 2013 and capacity restrained 2040 traffic volumes, the results are tabulated and provided in Table (5) through Table (7).

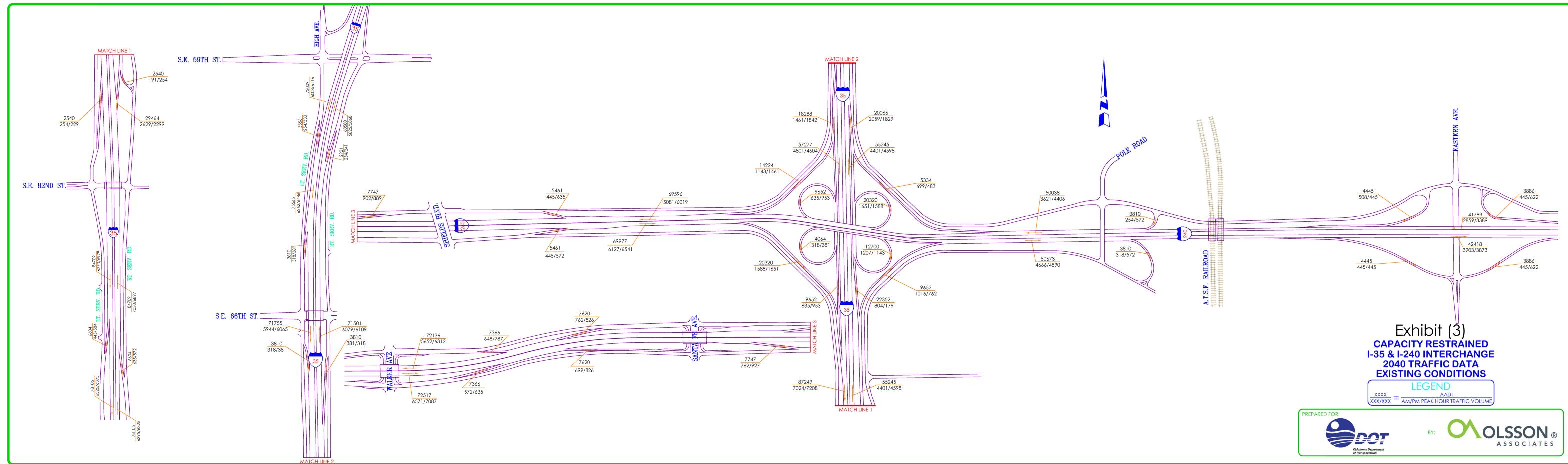
The 2013 operational analyses indicate that the overall level of traffic operation for the interchange during the peak hours of traffic is poor. The results show the interchange ramps and weaving sections along both I-35 and I-240 operate at poor levels of service. The analyses and observation show that the existing conditions do not provide a necessary safe access and required level of operation. The 2040 operational analyses on the existing conditions also indicate that the traffic operations will continue to be poor, if improvements are not considered for the existing interchange.

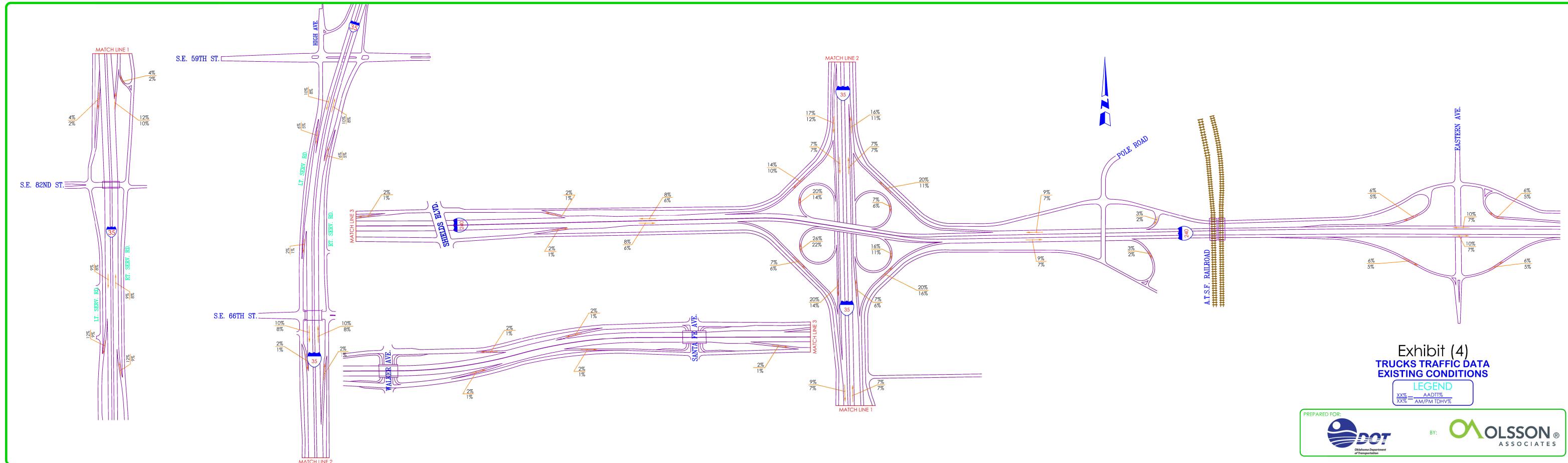


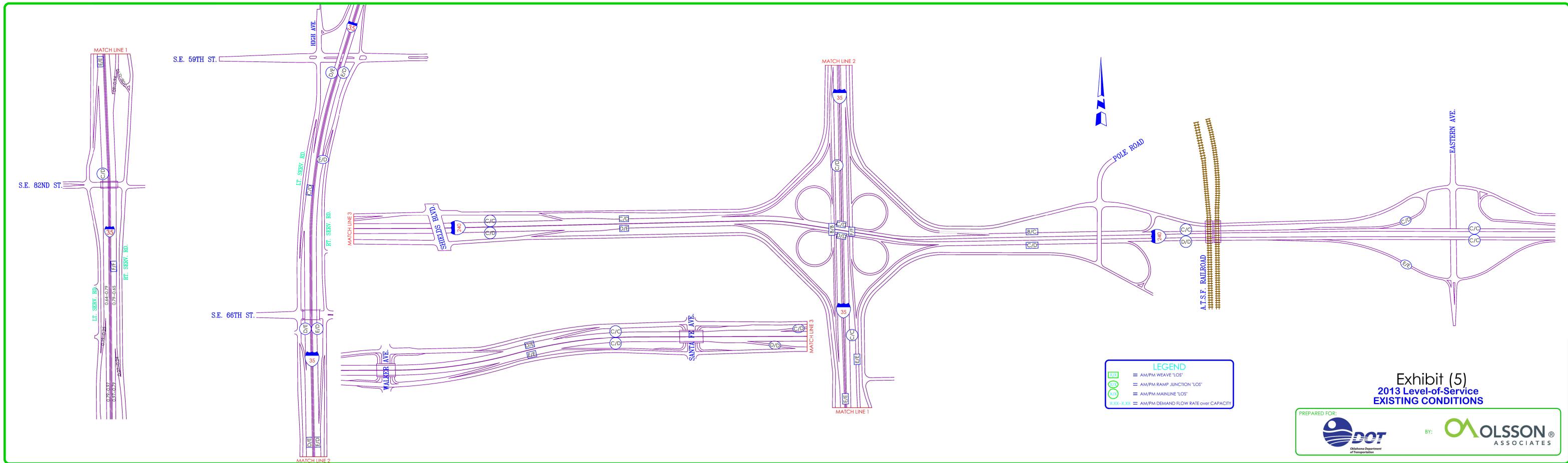


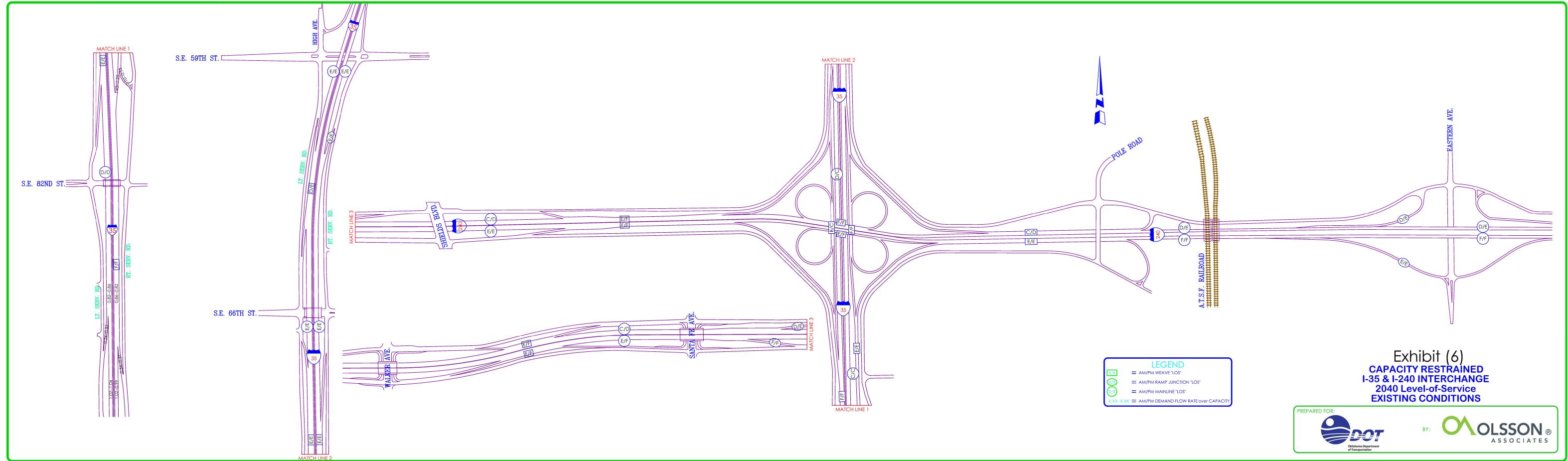
klahoma Department of Transportation













# BASIC FREEWAY ANALYSIS (EXISTING CONFIGURATION) Level of Service Utilizing 2013 and Capacity Constrained 2040 Traffic Volumes

Freeway Dir. of Travel	Location	LOS 2013 AM/PM Peak Hour	LOS 2040 AM/PM Peak Hour
I-35 Northbound	South of SE 89th St.	v/c = 0.97- 0.79	v/c = 1.02-
I-35 Northbound	North of On Ramp from SE 89th St.	v/c = 0.79- 0.65	v/c = 0.86- 0.82
I-35 Northbound	North of Off Ramp to I-35 Northbound C-D Rd.	C/C	C/C
I-35 Northbound	South of SE 66th St., North of Off Ramp to SE 66th St.	E/D	E/E
I-35 Northbound	South of SE 59th St., North of Off Ramp to SE 59th St.	E/D	E/E
I-35 Southbound	South of SE 59 <sup>th</sup> St., North of On Ramp from SE 59 <sup>th</sup> St.	D/E	E/E
I-35 Southbound	South of SE 66 <sup>th</sup> St., North of On Ramp from SE 66 <sup>th</sup> St.	D/E	E/E
I-35 Southbound	South of Off Ramp to I-240 Westbound	C/D	D/C
I-35 Southbound	North of SE 82 <sup>nd</sup> St., South of Off Ramp to SE 82 <sup>nd</sup> St.	C/D	D/D
I-35 Southbound	South of SE 89th St.	v/c = 0.79- 0.97	v/c = 1.02- 1.04
I-240 Eastbound	West of Santa Ave.	C/D	E/F
I-240 Eastbound	East of Shields Blvd.	C/D	F/F
I-240 Eastbound	East of Pole Rd. Off Ramp	D/D	F/F
I-240 Eastbound	East of Off Ramp to Eastern Ave.	C/C	F/F
I-240 Westbound	East of On Ramp from Eastern Ave.	C/C	D/E
I-240 Westbound	East of Pole Rd. On Ramp	C/C	D/E
I-240 Westbound	East of Shields Blvd.	C/C	C/D
I-240 Westbound	West of Santa Fe Ave.	C/C	C/D

Note: v/c = Volume / Capacity

Table (5)





# RAMP JUNCTION ANALYSIS (EXISTING CONFIGURATION) Level of Service Utilizing 2013 and Capacity Constrained 2040 Traffic Volumes

Freeway Dir. of Travel	Location	LOS 2013 AM/PM Peak Hour	LOS 2040 AM/PM Peak Hour
I-35 Northbound	Off Ramp to SE 59 <sup>th</sup> St.	E/D	E/E
I-240 Eastbound	Off Ramp to Shields Blvd.	D/D	F/F
I-240 Eastbound	Off Ramp to Eastern Ave.	E/E	E/E
I-240 Westbound	On Ramp from Eastern Ave.	C/D	D/E
I-240 Westbound	On Ramp from Shields Blvd.	C/D	D/E

Table (6)

# FREEWAY WEAVING ANALYSIS (EXISTING CONFIGURATION) Level of Service Utilizing 2013 and Capacity Constrained 2040 Traffic Volumes

Freeway Dir. of Travel	Weaving Segment Location	LOS 2013 AM/PM Peak Hour	LOS 2040 AM/PM Peak Hour
I-35 Northbound	On Ramp from SE 89 <sup>th</sup> St. to Off Ramp to I-35 Northbound C-D Rd.	F/F	F/F
I-35 Northbound C-D Rd.	On Ramp from SE Service Rd. to I-240 Eastbound	E/E	E/E
I-35 Northbound	On Ramp Loop from I-240 eastbound to Off Ramp Loop to I-240 Westbound	F/F	F/F
I-35 Northbound	On Ramp from I-240 Westbound to Off Ramp to SE 66 <sup>th</sup> St.	E/D	E/E
I-35 Southbound	On Ramp from SE 59 <sup>th</sup> St. to Off Ramp to SE 66 <sup>th</sup> St.	C/D	D/E
I-35 Southbound	On Ramp from SE 66th St. to Off Ramp to I-240 Westbound	D/E	E/E
I-35 Southbound C-D Rd.	On Ramp Loop from I-240 Westbound to Off Ramp Loop to I-240 Eastbound	B/B	В/С
I-35 Southbound	On Ramp from I-240 Eastbound to Off Ramp to SE 82 <sup>nd</sup> St.	E/E	F/F
I-240 Eastbound	On Ramp from Walker Ave. to Off Ramp to Santa Fe Ave.	E/E	E/F
I-240 Eastbound	On Ramp from Shields Blvd. to I-35 Southbound	D/E	F/F





I-240 Eastbound	On Ramp Loop from I-35 Southbound C-D Rd. to Off ramp Loop to I-35 Northbound C-D Rd.	D/D	E/F
I-240 Eastbound	On Ramp from I-35 Northbound C-D Rd. to Off Ramp to Pole Rd.	C/D	E/E
I-240 Westbound	On Ramp from Pole Rd. to Off Ramp to I-35 Northbound	B/C	C/D
I-240 Westbound	On Ramp Loop from I-35 Northbound C-D Rd. to Off Ramp Loop to I-35 Southbound C-D Rd.	C/D	F/F
I-240 Westbound	On Ramp from I-35 Southbound to Off Ramp to Shields Blvd.	C/D	E/F
I-240 Westbound	On Ramp from Santa Fe Ave. to Off Ramp to Walker Ave.	D/E	E/F

Table (7)





#### **Requirement 2: TRANSPORTATION SYSTEM MANAGEMENT (TSM)**

"The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access (23 CFR 625.2(a))."

Although ODOT has not applied High Occupancy Vehicle (HOV) lane strategies on Oklahoma's freeway system, provisions for HOV lanes, mass transit and ramp metering have all been included in all design phases of this project. All the necessary steps such as appropriate groups involvement, public participation, data collection, analysis techniques, public input on alternatives and preferred alternative selection have all been considered in the planning of HOV lanes during the NEPA process and screening categories. The ACOG Congestion Management System (CMS) Plan focuses on improving the existing and future transportation system performance in Oklahoma City by examining strategies for reducing Single Occupancy Vehicle (SOV) and promoting HOV use.

The final geometric cross-section through the I-35 and I-240 corridors will accommodate six (6) all-purpose lanes. The HOV lanes (for carpools and transit systems) can be accommodated by designating the left most lanes of both I-35 and I-240 corridors as HOV lanes for future travel demands beyond the target year 2040. The HOV lanes can be converted to light rail system in the future to provide additional passenger-carrying capacity. ODOT along with ACOG are currently conducting other TSM alternatives under the Transportation Improvement Program (TIP) that include,

- Incident Management
- Intelligent Transportation Systems (ITS)
- Local Government Projects such as,
  - Traffic signal coordination
  - O Signal preemption
  - Full or integrated Advanced Transportation Management Systems (ATMS) to assist in monitoring the roadway
  - Road weather detection
  - O Real-time video display, control and communications
  - O Dynamic Message Signs (DMS) and Highway Advisory Radio (HAR)
  - Operations of signals, signs, and Closed Circuit Television cameras under emergency evacuation procedures.





#### **Requirement 3: OPERATIONAL ANALYSIS**

"The proposed access point does not have a significant adverse impact on the safety and operation of the Interstate facility based on an analysis of current and future traffic. The operational analysis for existing conditions shall, particularly in urbanized areas, include an analysis of sections of Interstate to and including at least the first adjacent existing or proposed interchange on each side. Crossroads and other roads and streets shall be included in the analysis to the extent necessary to assure their ability to collect and distribute traffic to and from the interchange with the new or revised access points."

The current configuration of I-35 and I-240 Interchange is a full cloverleaf system interchange which was designed and constructed in 1960s. The areas surrounding the interchange has developed throughout the years. This location is one of the crowded urbanized areas in Oklahoma City. High traffic volumes, outdated interchange design, improper ramp spacing, and loop ramps with less than adequate radii are contributing to the problems that this interchange is experiencing now.

The evaluation of the existing conditions for the interchange is documented in the EXISTING FACILITIES section (Page 4) of this report. The poor traffic operation of this interchange is clearly affecting the adjacent interchanges in this area. I-240 and Eastern Avenue interchange (1.0 mile east), the I-240 and Shields Boulevard interchange (0.66 mile west), I-35 and SE 66<sup>th</sup> Street interchange (0.5 north) and I-35 and SE 82<sup>nd</sup> Street interchange (0.5 mile south) do not operate properly during the peak hours of traffic operation.

The design deficiencies between the interchange's ramps and the SE 66<sup>th</sup> Street, SE 82<sup>nd</sup> Street and Shields Boulevard cause a flow breakdown in this area during the peak hours of traffic operation. The recurring traffic congestion, high collision rate, and the results of the traffic operational analysis demand improvements to this interchange.

The proposed interchange configuration for this location is a three (3) level partial cloverleaf system interchange. The highway design consistency that ensures successive elements are coordinated to produce harmonious and homogeneous driver performances and to create communicative aspects between the driver and the freeway and interchange complex is maintained throughout the proposed design. The interstate system design criteria such as basic lanes, lane balance, applications of auxiliary lanes, route continuity, appropriate interchange form, no weaving within interchange on freeway, right exits and entrances only, single exit on freeway per interchange (except one location-I-240 eastbound where two exits are needed to provide for the I-35 northbound and southbound movements), exit in advance of crossroad, simplified signing, implementation of decision sight distance, freeway and exit/entrance ramp speed relationships and ramp spacing are





maintained and followed in the design of the proposed configuration.

The proposed interchange configuration will provide the eight (8) primary basic movements according to AASHTO "A Policy on Design Standards Interstate System" which is essential to a system interchange. All the entrance and exit ramps are properly designed to provide safe and acceptable merge and diverge lengths throughout the interchange area. The proposed interchange design meets or exceeds the latest edition of AASHTO "A Policy on Geometric Design of Highways and Streets" guidelines and design criteria.

In order to maintain an acceptable level of traffic operation on interstate highway and also enhance the safety of the highway users, the I-35 partial interchanges north of SE 82<sup>nd</sup> Street and south of SE 66<sup>th</sup> Street will be removed. The close proximity of the arterial streets to the interchange led to this design decision. The adjacent upstream-downstream ramps and the service roads around the interchange will compensate for the removed movements.

The existing I-240 westbound exit ramp and eastbound entrance ramp located east of Shields Boulevard cannot be maintained due to the close proximity of the I-240 conventional diamond interchange at Shields Boulevard located just west of the I-35 and I-240 system interchange, the complexity of the proposed design configuration, interstate highway design criteria, and proper ramp spacing were the supporting factors. This will create a partial interchange at Shields Boulevard. The HCS ramp junction analysis indicates that the I-240 westbound on ramp from Shields Blvd. currently operates at LOS C/D during the AM/PM peak hours respectively and will operate at LOS D/E during the design year. Similarly, the I-240 eastbound off ramp to Shields Blvd. operates at LOS D/D now and F/F by the design year.

I-240 and Shields Boulevard interchange is located approximately 3,475 feet west of I-35. The egress and ingress between I-240 and Shields Boulevard are provided by four slip ramps through one-way service roads north and south of I-240. Santa Fe Avenue is approximately 1,700 feet west of Shields Boulevard and the two turn arounds located east and west of Santa Fe Avenue connect the two service roads. Walker Avenue is located approximately 2,600 feet west of Santa Fe Avenue. The two eastbound entrance and exit ramps and westbound entrance and exit ramps between these two arterial streets provide access to and from I-240. Exhibit (7) shows the existing ramp configurations in this area. It is worth mentioning that the westbound successive entrance ramps and eastbound exit ramps east and west of Santa Fe Avenue are not common practice.

As mentioned earlier, the two exit and entrance ramp movements east of Shields Boulevard cannot be provided with the new design configuration for the I-35 and I-240 interchange and creates a partial interchange. Exhibit (8) shows that lane balance on I-240 cannot be





properly maintained with the new I-35 and I-240 design configuration due to the partial interchange at Shields Boulevard. I-35 northbound and southbound movements to I-240 westbound are merged together to form a two-lane entrance ramp to I-240 westbound. It is shown that a five-lane section is created at the gore area and further west the two outside lanes are dropped improperly due to the existing I-240 westbound entrance ramp from Shields Boulevard. The same is true for I-240 eastbound, in order to provide proper connection from I-240 eastbound to I-35 north and southbound, two lanes are added to I-240 eastbound right after the I-240 eastbound exit ramp to Shields Boulevard.

The basic number of lanes for a substantial length of Interstate Highway 240 is established here as three in each direction. According to the Interstate Design Guide, there should be balance in the number of traffic lanes on the freeway and ramps in order to provide efficient traffic operation through and beyond an interchange. It is the proper coordination of lane balance and basic number of lanes that allows an auxiliary lane between the entrance and exit terminals to be provided on urbanized interchanges that are closely spaced. In order to improve traffic operation on I-240 mainline west of I-35 and to provide lane continuity as well as lane balance that accommodates auxiliary lanes between interchanges, ODOT proposes to remove the I-240 westbound entrance and eastbound exit ramps west of Shields Boulevard and construct a westbound exit and an eastbound entrance ramps east of Santa Fe Avenue. This design will change the partial interchange at Santa Fe Avenue to a full interchange and provides proper lane balance and auxiliary lanes between the Santa Fe Avenue and the I-35 and I-240 interchanges.

Traffic operational analysis indicates the weaving sections on I-240 between the Santa Fe Avenue and Walker Avenue ramps will be congested during the peak hours of operations. Due to the close proximity of these two arterial streets, the existing weave lengths are very short. The HCS weaving analysis is included in this report and the level of service (LOS) analyses for the existing conditions and proposed design utilizing existing and future traffic volumes are tabulated below.





#### I-240 FREEWAY WEAVING ANALYSIS (SANTA FE AVE. TO WALKER AVE.)

LOCATION	EASTBOUND		WESTE	BOUND	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	
2013 EXISTING	Е	Е	D	Е	
2040 EXISTING	Е	F	Е	F	
2040 DESIGN	F	F	F	F	

Table (8)

The proposed design configuration is shown on Exhibit (9). The forecasted 2040 capacity restrained AADT and AM/PM peak hour traffic volumes and the corresponding AADTT and TDHV for the proposed design configuration are shown on Exhibits (10) and (11) respectively. The same input assumptions that was consistent with the existing conditions used for the freeway analysis

Peak Hour Factor (PHF)	0.92
Terrain	Level
I-35, I-240 Free Flow Speed (FFS)	69.6 mph
Directional ramps Free Flow Speed	45 mph
Loop Ramps Free Flow Speed	25 mph

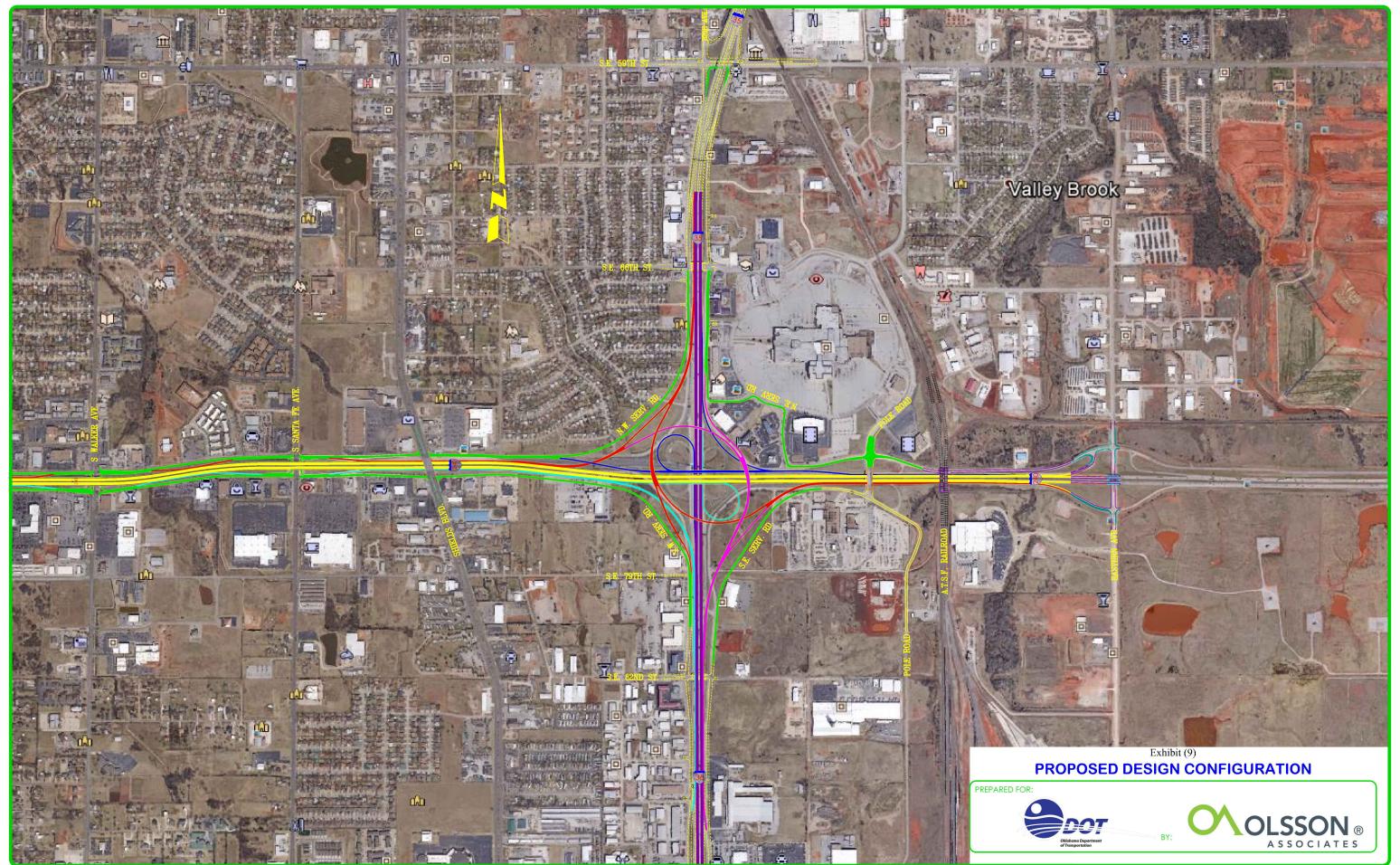
The results of the 2040 design year HCS traffic operational analysis on the proposed design configuration are shown on Exhibit (12). The results have also been tabulated and are shown in Table (9) through Table (11). As the analyses indicate, this proposed access point change does not have an adverse impact on the safety and operation of the interstate highways 35 and 240, except the I-240 weaving segment between Santa Fe and Walker Avenues. In fact, the proposed design will improve the traffic operation on the interstate highways and creates a more harmonious and smoother operation with the adjacent interchanges. The results of the 2040 capacity restrained LOS analyses for the eight (8) primary movements of the existing and the proposed interchange configurations are tabulated and shown on Table (12) for comparison purposes only.

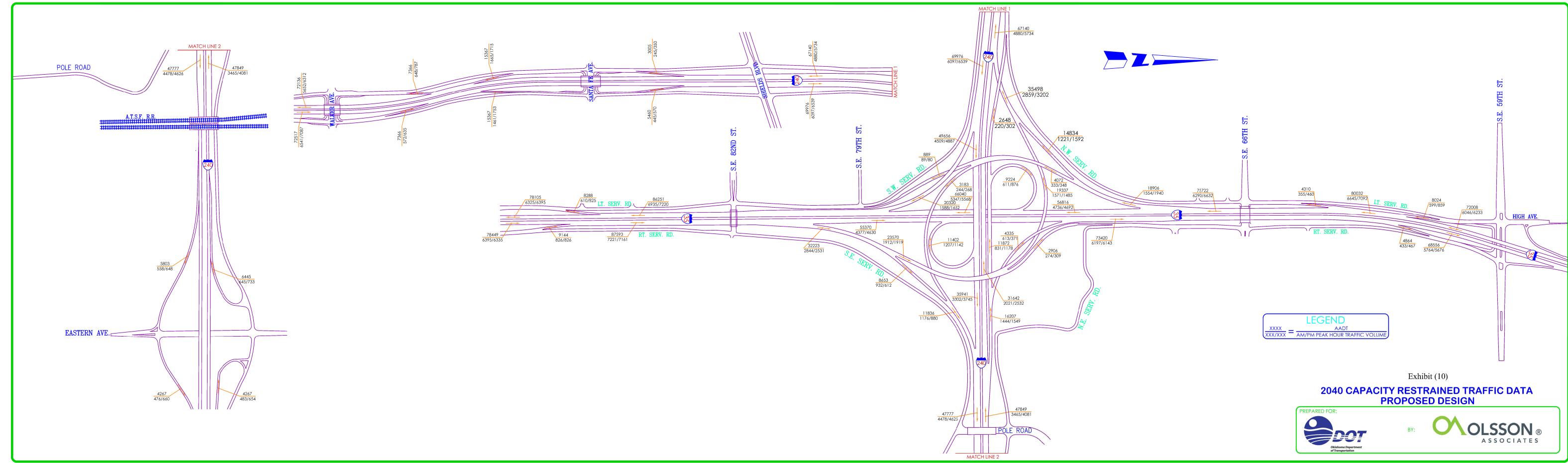


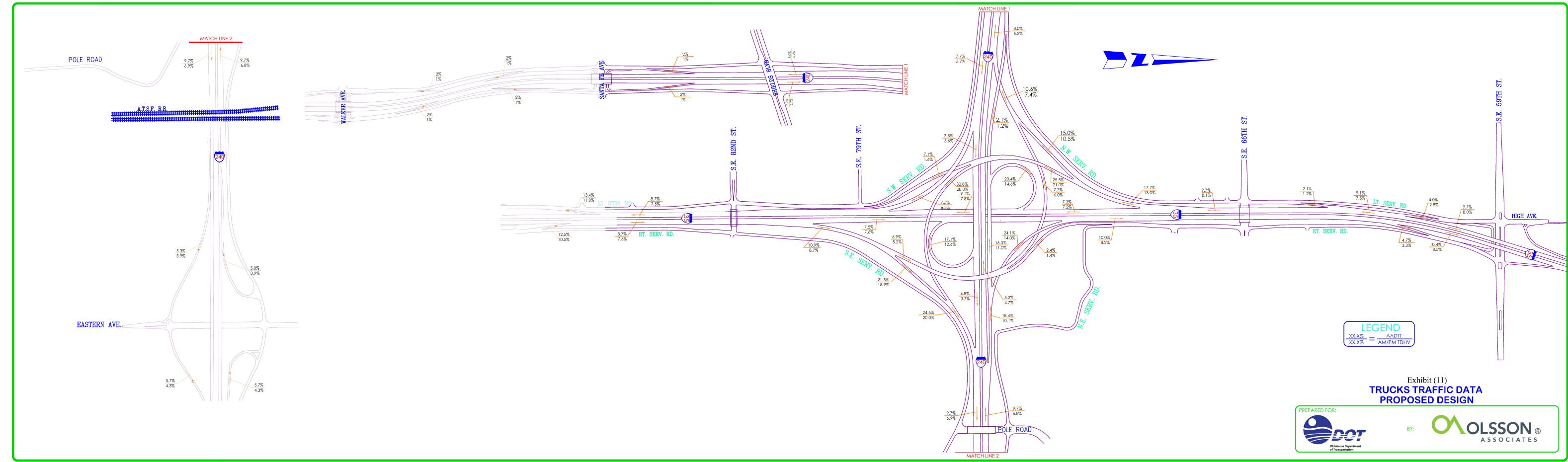


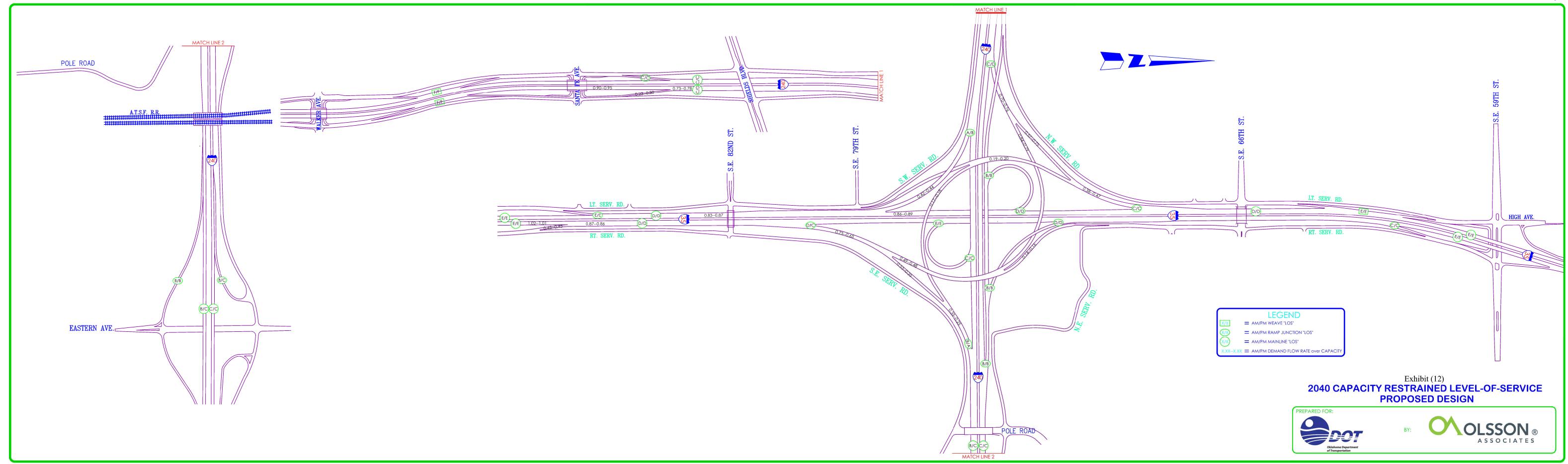


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# BASIC FREEWAY ANALYSIS (PROPOSED DESIGN) Level of Service Utilizing Capacity Restrained 2040 Traffic Volumes

Freeway Dir. of Travel	Location	LOS AM/PM Peak Hour
I-35 Northbound	South of SE 89 <sup>th</sup> St.	E/E
I-35 Northbound	North of On Ramp from SE 89th St.	D/D
I-35 Northbound	South of SE 59 <sup>th</sup> St.	E/E
I-35 Southbound	South of SE 59th St.	E/E
I-35 Southbound	South of Off Ramp to SE 66th St.	D/D
I-35 Southbound	North of SE 89 <sup>th</sup> St.	D/D
I-35 Southbound	South of SE 89 <sup>th</sup> St.	E/E
I-240 Eastbound	West of Shields Blvd.	C/D
I-240 Eastbound	East of Pole Rd.	В/С
I-240 Westbound	East of Pole Rd.	C/C
I-240 Westbound	East of Shields Blvd.	C/C

Table (9)

# RAMP JUNCTION ANALYSIS (PROPOSED DESIGN) Level of Service Utilizing Capacity Restrained 2040 Traffic Volumes

Freeway Dir. of Travel	of Location A	
I-35 Northbound	On Ramp from SE 89 <sup>th</sup> St.	Freeway-Upstream v/c = 1.02 / 1.01 Ramp v/c = 0.45 / 0.45 Freeway-Downstream v/c = 0.87 / 0.86
I-35 Northbound	Off Ramp to I-240 Eastbound	D/C
I-35 Northbound	On Ramp from I-240 Eastbound	E/E
I-35 Northbound	On Ramp from I-240 Westbound	D/D





I-35 Northbound	Off Ramp to SE 59th St.	C/C
I-35 Southbound	Off Ramp to I-240 Westbound	C/C
I-35 Southbound	On Ramp from I-240 Westbound C-D Rd.	D/D
I-35 Southbound	On Ramp from I-240 Eastbound	Freeway-Upstream v/c = 0.86 / 0.89 Ramp v/c = 0.42 / 0.44 Freeway-Downstream v/c = 0.83 / 0.87
I-35 Southbound	Off Ramp to SE 89th St.	E/E
I-240 Eastbound	On Ramp from Santa Fe Ave.	Freeway-Upstream v/c = 0.90 / 0.95 Ramp v/c = 0.23 / 0.30 Freeway-Downstream v/c = 0.73 / 0.78
I-240 Eastbound	Off Ramp to I-35 Southbound	A/B
I-240 Eastbound	Off Ramp to I-35 Northbound	C/C
I-240 Eastbound	On Ramp from I-35 Northbound	B/A
I-240 Eastbound	Off Ramp to Eastern Ave.	B/B
I-240 Westbound	On Ramp from Eastern Ave.	B/C
I-240 Westbound	Off Ramp to I-240 Westbound C-D Rd.	B/B
I-240 Westbound	Off Ramp from I-240 Westbound C-D Rd. to I-35	B/B
I-240 Westbound	On Ramp from both I-35 Southbound & Northbound	C/D
I-240 Westbound	Off Ramp to Santa Fe Ave.	C/C

Note: v/c = Volume/Capacity

Table (10)

# FREEWAY WEAVING ANALYSIS (PROPOSED DESIGN) Level of Service Utilizing Capacity Restrained 2040 Traffic Volumes

Freeway Dir. of Travel	Weaving Segment Location	LOS AM/PM Peak Hour
I-35 Southbound	On Ramp from SE 59 <sup>th</sup> St. to Off Ramp to SE 66 <sup>th</sup> St.	E/E
I-240 Eastbound	On Ramp from Walker Ave. to Off Ramp to Santa Fe Ave.	F/F
I-240 Westbound	On Ramp from Santa Fe Ave. to Off Ramp to Walker Ave.	F/F

Table (11)





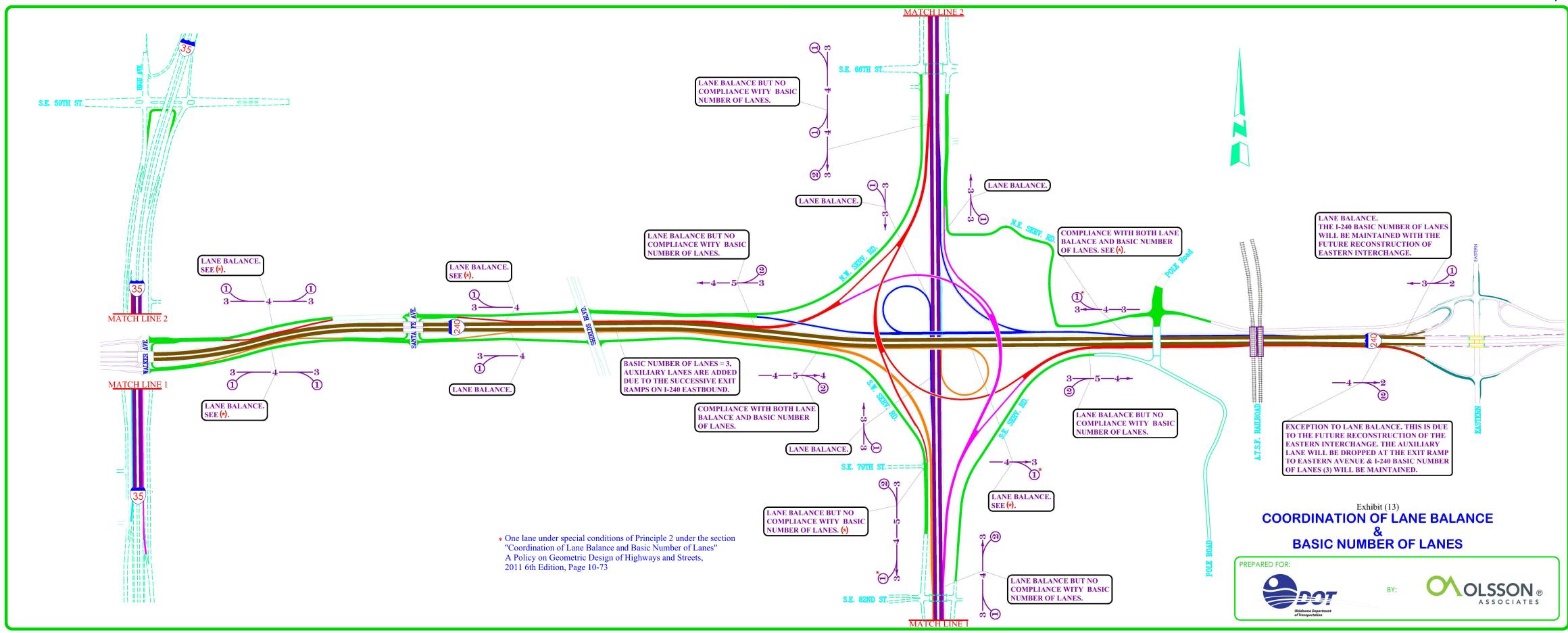
# The 2040 Level of Service (LOS)-Eight Primary Movements, EXISTING & PROPOSED DESIGN $\,$

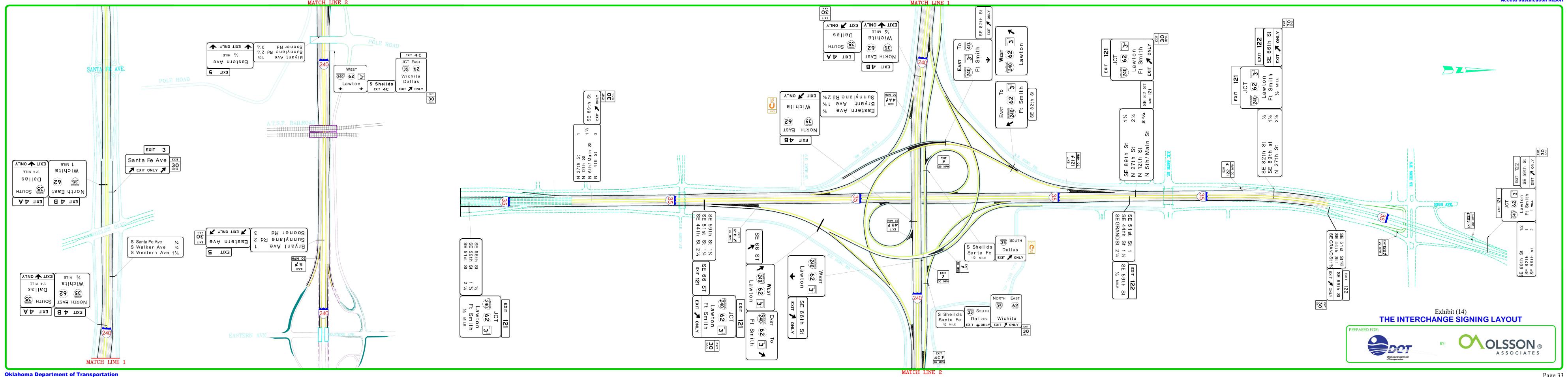
The Eight Primary Movements			EXISTING CONDITIONS	PROPOSED DESIGN
Diverging		Merging	LOS AM/PM Peak Hour	
			Diverging(Merging)	
I 25 Nordshound	4	I-240 Eastbound	E/E(E/E)	D/C(B/A)
I-35 Northbound	to	I-240 Westbound	F/F(F/F)	D/C(C/D)
I 25 Couthbound	to	I-240 Eastbound	B/C(E/F)	C/C(B/A)
I-35 Southbound	to	I-240 Westbound	E/F(E/F)	C/C(C/D)
I-240 Eastbound	to	I-35 Northbound	E/F(F/F)	C/C(E/E)
1-240 Eastbound	to	I-35 Southbound	F/F(F/F)	A/B(v/c < 1)
I-240 Westbound	to	I-35 Northbound	C/D(E/E)	B/B(D/D)
	to	I-35 Southbound	F/F(B/C)	B/B(D/D)

Note: v/c = Volume/Capacity

Table (12)









#### **Requirement 4: ACCESS CONNECTIONS AND DESIGN**

"The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a) (2), and 655.603(d))."

The Interstate Highways 35 and 240 are full access controlled facilities and the proposed system interchange will provide all primary traffic movements. All the operational and design criteria associated with interstate freeway and interchange design such as basic lanes, lane balance, applications of auxiliary lanes, route continuity, appropriate interchange form, no weaving within interchange on freeway have been maintained. Right exits and entrances only, single exit on freeway per interchange (with the exception of I-240 eastbound where two exits are needed to provide for I-35 northbound and southbound movements), exit in advance of crossroad, simplified signing, implementation of decision sight distance, freeway and exit/entrance ramp speed relationships, ramp spacing have all been considered and followed in the design of this facility.

All the geometric controls and criteria such as design speed, sight distance, curvature and superelevation, width of traffic lanes and shoulders, side slopes, medians, horizontal clearance to obstructions, vertical clearance, cross section and structural capacity for the proposed access design will meet or exceed current standards under the latest versions of AASHTO "A Policy on Design Standards Interstate System" and AASHTO "A Policy on Geometric Design of Highways and Streets".

Although no design exception is anticipated at this level, in any situation where the design is less than what is described by the standards, a design exception will be submitted to FHWA for review and approval.





#### **Requirement 5: TRANSPORTATION LAND USE PLANS**

"The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted metropolitan transportation plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93."

The proposal for transportation improvements within the I-35 and I-240 corridors is consistent with local and regional land use and transportation plans. The ACOG regional travel demand model data was used in determining the forecasted future traffic for the design year 2040. The forecasted traffic for the proposed system incorporates the future land use and other development plans in the metropolitan and suburban Oklahoma City communities that would affect the project corridors. The proposed widening of I-35 and I-240 to six (6) lane access controlled facilities is consistent with the objectives identified in the Oklahoma City Area Regional Transportation Study (OCARTS) 2035 Long Range Plan.

The provisions of 23 Code of Federal Regulations (CFR) part 450 and transportation conformity requirements of 40 CFR parts 51 and 93 have been met.





#### Requirement 6: COMPREHENSIVE INTERSTATE NETWORK STUDY

"In corridors where the potential exists for future multiple interchange additions; a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan (23 U.S.C. 109(d), 23 CFR 625.2(a), 655.603(d), and 771.111)."

The interchange study area is located in an urbanized area with a developed local arterial system. There are multiple existing interchanges on the I-35 and I-240 corridors adjacent to the interchange study. The I-240 interchanges at Eastern Avenue, Bryant Avenue, Sunny lane Road and Sooner Road are spaced one (1) mile apart and are located east of the subject interchange. The interchanges at Shields Boulevard, Santa Fe Avenue, and Walker Avenue west of the I-35 and I-240 interchange are less than a mile apart. There are multiple interchanges on I-35 north and south of the subject interchange that are less than a mile apart.

A comprehensive Interstate Network Study is not needed due to the fact that no interchange addition or new access with multiple interchanges will ever be required considering the spacing of the existing interchanges on the interstate system within the I-35 and I-240 corridors around the I-35 and I-240 interchange.





### Requirement 7: COORDINATION WITH TRANSPORTATION SYSTEM IMPROVEMENTS

"When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2(a) and 655.603(d)). The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point (23 CFR 625.2(a) and 655.603(d))."

The revision and improvements to this interchange were not generated by any specific development but were developed as part of the long-range planning process as improvements to the overall transportation system. Transportation System Improvements that would apply to this corridor include transit improvements, Intelligent Transportation System (ITS) improvements, and travel demand management (TDM) alternatives. The local transit authority, the Central Oklahoma Transportation and Parking Authority (COTPA), which is a part of the City of Oklahoma City local government.

COPTA and Cleveland Area Rapid Transit (CART) have programs to encourage carpool and transit usage in these corridors as well as region wide. Some of the routes within the study area are;

- Route 013 S WESTERN/I-240 CROSSTOWN, Transit Center, SW Medical Center, Shartel Towers, Oklahoma City Community College, and Variety Care. Days Served: Monday – Saturday. Frequency: 30 min. (Week), 45 min. (Sat)
- Route 014 <u>SE BRYANT or SUNNYLANE</u>, Transit Center, Plaza Mayor, Valley Brook, Metro Tech/Bryant Campus, and Sunnylane. Days Served: Monday – Saturday. Frequency: 45 min.
- Route 024 <u>NORMAN</u>, Norman, University of Oklahoma, Downtown Oklahoma City, State Capital, and OU Medical Center. Days Served: Monday – Friday. Frequency: N /A.

COPTA and ODOT are members of the ACOG Board of Directors and provide direction to implement TSM on an annual basis. ITS improvements in this corridor include fiber optic lines, overhead changeable message signs and video cameras. This allows for efficient traffic operation management, incident management and implementation of TMS alternatives. As mentioned previously, provisions are made for future HOV lanes within these corridors. The inside lane in each direction can be designated as HOV lane.





#### **Requirement 8: STATUS OF PLANNING AND NEPA**

"The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing (23 CFR 771.111)."

A National Environmental Policy Act (NEPA) document has been produced on these corridors which address all environmental concerns such as noise abatement, wetlands, endangered species, neighborhood impacts, commercial business impacts, etc. The NEPA document also includes a copy of the preliminary operational analysis related to traffic operations and traffic safety at the time it was issued.

Six (6) design alternatives suitable for a system interchange were considered for this location. The evaluation process based on total cost, level-of-service, accessibility, constructability and right-of-way requirements would reduce them to three (3). Design alternatives 4, 5 and 6 were ranked the highest. These three (3) design alternatives were further refined and elements from each were combined to form design alternative 5A.

A public meeting was held in March of 2003 to present the No-Build, Six (6) initial design alternatives and the design alternative 5A. Based on public inputs from another public meeting held on August of 2003 and alternative evaluation the design alternatives were reduced to two and subsequently the preferred (proposed) design alternative was selected.

As part of the proposed interchange design, the exit ramp from eastbound Interstate 240 to Pole Road and entrance ramp from Pole Road to westbound Interstate 240 are eliminated due to the geometric and safety constraints. During the final public meeting held on June of 2005 and meetings with property owners, concerns were raised over the reduced access to Crossroads Mall. The Department agreed to conduct additional design and traffic studies in order to better address the public concerns.

Closing Interstate 240 access to and from Pole Road would require traffic to utilize the existing diamond interchange at Eastern Avenue, half a mile east of Pole Road. To improve the traffic circulation at Eastern Avenue Interchange, signalization of ramp terminals with Eastern Avenue were analyzed and considered. To enhance the traffic circulation of Crossroads Mall access with Interstate 35, an additional turnaround lane on the south side of the existing SE 59<sup>th</sup> Street bridge was evaluated and considered.

An EA/FONSI (environmental assessment/finding of no significant impact) for this project was issued by FHWA on September 1, 2005.





A reevaluation and reconfiguration of the induced I-240 and Shields Blvd. partial interchange was necessary in order to provide proper lane balance on I-240. The decision was to remove the I-240 westbound entrance and eastbound exit ramps west of Shields Blvd. and construct a westbound exit ramp and an eastbound entrance ramp east of Santa Fe Avenue. This design will change the existing partial interchange at Santa Fe Avenue to a full interchange and provides proper lane balance and auxiliary lanes between Santa Fe Avenue and I-35 and I-240 interchanges.

The final public hearing was held on June 11, 2015 to inform the public about the changes in design and access. The Department is currently reevaluating the EA/FONSI and it will be submitted to FHWA for approval upon completion. The solicitation responses and written comments from the public meeting are presented in Appendix D.





#### **SAFETY ANALYSIS**

A traffic collision analysis was performed to review the existing crash pattern along I-35 and I-240 within the interchange area (i.e. I-35 from SE 89<sup>th</sup> Street to SE 66<sup>th</sup> Street and I-240 from Shields Boulevard to Eastern Avenue). During the 5 year period between 2008 and 2012 a total of 2,206 collisions occurred along the two highway corridors; 65.4 percent of the collisions were property damage, 34.3 percent injury, and 0.3 percent fatal crashes. In addition to seven fatalities, the collision report identifies 1,084 injured people within this period.

The collision report also indicates the crash pattern as 22.1 percent of collisions occurring on Fridays with 39.6 percent occurrence during the mid-morning to afternoon hours. In addition, 88.6 percent of the collisions were on dry roadway and 55.1 percent during clear weather conditions.

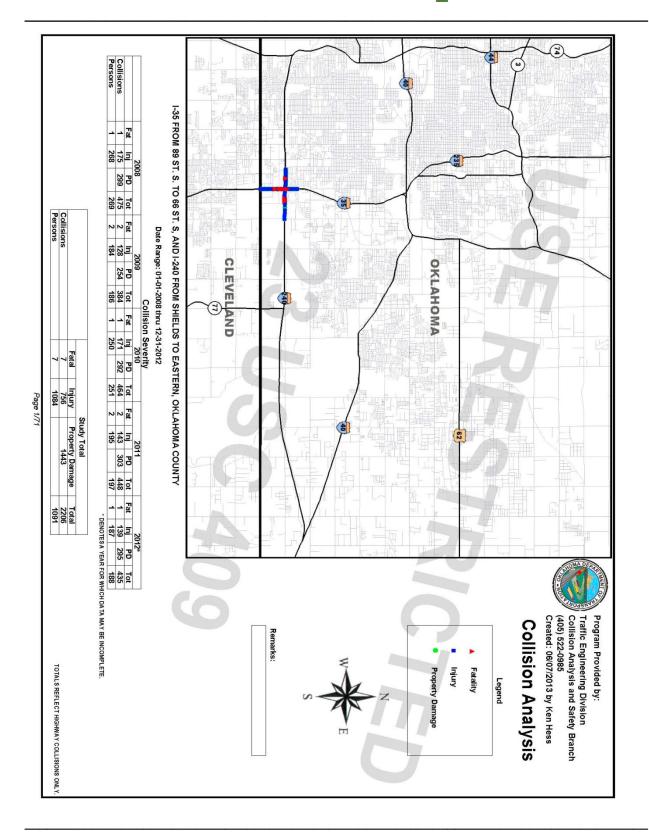
It was identified in the analysis that rear-end, side-swipe, and off-road (fixed object) accidents were the most common type of accidents reported along these corridors, accounting for 64.3, 9.3, and 3.6 percent of the total accidents, respectively.

- Rear-end collisions are common along freeways experiencing high level of congestion. Rear-end collisions also occur along a high speed roadway when traffic is forced to stop for an at-grade intersection, such as at freeway ramp terminals. The report indicates that 21 percent of collisions as drivers following too close and 8.6 percent as vehicles with unsafe speed.
- Off-road crashes on a freeway can often be caused by driver inattention, excessive speeds, or poor weather conditions. The report shows that 7.9 percent of collisions as driver's inattention and 10 percent as wet roadway conditions.
- Side-swipe collisions are typically associated with freeway lane changing maneuvers, such as merging and diverging. These crashes usually occur along the interchange ramps or at the ramp terminals. The collision report identifies 4.8 percent of collisions as improper lane change.

The safety benefits of reducing congestion within this interchange are expected to become more pronounced over time as this area continues to experience high traffic due to various commercial and industrial developments.













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13.7 303

20.3 31 448

6.3 10 139

13.4 19.7 23 295

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Tot 267 15 8 8 12 23 23 23

Tot 329 329 12 17

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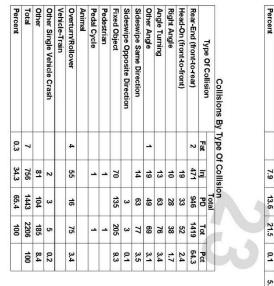
1-35 FROM 89 ST. S.

TABULATION OF COLLISIONS

UT-UT-2008 INTU T2-31-2012 TO 66 ST. S, AND I-240 FROM SHIELDS TO E.	
UT-01-2008 INTU 12-31-2012 . TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUN	

9008 Thru 12-31-2012 ROM SHIELDS TO E	112-31 HELDS	-2012 TO EA	STERN	, OKLA	008 Thru 12-31-2012 ROM SHIELDS TO EASTERN, OKLAHOMA COUNTY	TNUO	~	
7		009 2	20	2010			20	2011
PD	Tot	Fat	<u>5</u> .	PD	Tot	Fat	JT.	PD
160	237	_	97	205	303		88	195
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2	35		15	21	36		12	35
24								

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 reated: 06/07/2013 by Ken Hess



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Train
Pedestrian
Animal
Pedal Cycle

Unit Type

Fat

3 Tot

Fat

<u>5</u>

2009 ni PD Tot

Fat Inj

2010 PD

Tot Fat Inj

3

Tot

Fat Jŋ.

2012\*

8 Tot Units By Unit Type





Other Single Vehicle
Other Multi-Vehicle CMV Pedestrian Animal Parked Vehicle Pedal Cycle **Unit Type** Units By Unit Type 10 0.2 Fat 4 0 <u>J</u> 1589 35.4 10 38 123 1415 4 14 114 153 149 276 2628 4048 2895 4494 64.4 100 Pota Tot Pct 0.3 3.4 6.1 90.1

Train

Percent

Other Multi-Vehicle Other Single Vehicle Parked Vehicle

5 28 342 379 8.4

25 26 548 599 13.3

30 55 890 979 21.8

20 231 258 5.7

14 14 29 462 506 11.3

1 21 50 695 767 17.1

2 2

26 332 366 8.1

2 23 22 22 551 598

2 31 48 885 966 21.5

9 27 253 297 6.6

24 38 542 604 13.4

9 22 257 289 6.4

 28
 38

 34
 56

 525
 783

 588
 879

 13.1
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5 5 33 67 795 903 20.1

0.1

TABULATION OF COLLISIONS
01-01-2008 Thru 12-31-2012
I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Traffic Engineering Division
Collision Analysis and Safety Branch
(405) 522-0985 Program Provided by:

Created: 06/07/2013 by Ken Hess





Van (10,000 lbs. or less) Truck More Than 10,000 lbs Passenger Van Sport Utility Vehicle (SUV)

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588 13.1

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Farm Machinery

Motor Home Motor Scooter/Moped Motorcycle Bus (16+ seats) Bus/Large Van (9-15 seats)

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9

#### I-35\_I-240 INTERCHANGE

Passenger Vehicle-4 Door Passenger Vehicle-Convertible Passenger Vehicle-2 Door

73 3 145

Tot 100 365 6 215

3 43 2 95 28 5

PD 54 195 2

Tot 83 291 4

83

PD 48 48 151 222 222 2

Tot 78 350 350 8 233

2 4

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182

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2011

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PD 42 248

\_\_\_ 369 53 Tot

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52 52 228 130

75 339 34 194

⊿ Fa

Vehicle Type

Fat

2008

Truck-Tractor (bobtail)

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20 1

Truck-Tractor/Triple fruck-Tractor/Double Truck-Tractor/Semi-Trailer School Bus

ruck/Trailer

Single-Unit Truck (3 or more axles) Single-Unit Truck (2 axles) Pickup Truck





TABULATION OF COLLISIONS
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Vehicles By Vehicle Type

Traffic Engineering Division
Collision Analysis and Safety Branch Program Provided by: Created: 06/07/2013 by Ken Hess (405) 522-0985

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Vehicles By Vehicle Type

Vehicle Type			Total		1
	Fat	ī	PO	Tot	Pct
Passenger Vehicle-2 Door	_	150	248	399	8.9
Passenger Vehicle-4 Door	2	599	1113	1714	38.2
Passenger Vehicle-Convertible		6	16	22	0.5
Pickup Truck		320	657	977	21.8
Single-Unit Truck (2 axles)		17	32	49	:
Single-Unit Truck (3 or more axles)		ა	8	13	0.3
School Bus					
Truck/Trailer		ယ	9	12	0.3
Truck-Tractor (bobtail)		_	œ	9	0.2
Truck-Tractor/Semi-Trailer		21	71	92	2.0
Truck-Tractor/Double	_		2	ω	0.1
Truck-Tractor/Triple					
Bus/Large Van (9-15 seats)		2	ω	5	0.1
Bus (16+ seats)			_	_	
Motorcycle	သ	52	ယ	58	1.3
Motor Scooter/Moped		з		ω	0.1
Motor Home			1	1	
Farm Machinery			1	1	
ATV				7	4
Sport Utility Vehicle (SUV)	သ	304	535	842	18.7
Passenger Van		77	113	190	4.2
Truck More Than 10,000 lbs.			6	6	0.1
Van (10,000 lbs. or less)		10	24	32	0.8
Other		16	4	60	1.3
Total	10	1586	2895	4491	100
Percent	0.2	35.3	64.5	100	

TABULATION OF COLLISIONS
01-01-2008 Thru 12-31-2012
I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 Created: 06/07/2013 by Ken Hess









TABULATION OF COLLISIONS
01-01-2008 Thru 12-31-2012
I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHELDS TO EASTERN, OKLAHOMA COUNTY

Traffic Engineering Division
Collision Analysis and Safety Branch
(405) 522-0985 Created: 06/07/2013 by Ken Hess Program Provided by:

Weather Conditions	Total 1215	Percent 55.1
Clear	1215	55.1
Clouds Present	799	36.2
Raining/Fog	165	7.5
Snowing/Sleet/Hail	21	1.0
Other	6	0.3
Total	2206	100

Wet (Water)
Ice, Snow, or Slush
Mud, Dirt, Gravel, or Sand

Roadway Conditions

Daylight 1594 170

Lighted 276 38

Total 1955 221 21

Percent 88.6 10.0 1.0

Unknown

Darkness 43

1785 80.9

49

321 14.6

8 2206 100

100

Thursday Tuesday Wednesday

Monday Sunday

Day

Friday

Saturday

Page 6/71







Bridge
Work Zone
Cross Median
Train Collision Special Feature Collisions By Special Feature → Fat 4 <u>Jī</u>. 13 B w a

Other No Improper Action Wrong Way

0.1

60.8

1.0 4

0.1

0.2

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0.2

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49

19 12 127

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814 16 1576

1419 67 2891

2236 84

49.9 1.9

0.7

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1467

Defective Vehicle **Negligent Driving** Inattention Unsafe Speed

Left of Center

Improper Passing Improper Parking Improper Backing Improper Stop

Following Too Close Improper Lane Change Fat Apparently Normal 797 127 166 45 2 2 ₫. TABULATION OF COLLISIONS
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY 1391 54 2721 596 192 136 P 209 2 ∞ NNN 18 Fat Ability Impaired 25 <u>J</u> Alcohol Involved Po 2 \$ 2 Fat Odor Detected ₫. **Drivers By Driver Conditions** P-D Fat Sleep Suspected <u>5</u> P-D Drug Use Indicated Fat 5 ω \_ 2 P **Unknown Condition** Fat ⇉ ₫.

5 6 공

Fat

Po

Collision Severity

23 5

21 97

Pcnt 2.2

20

0.5

Failed to Signal Improper Turn Improper Start

Failed to Stop Failed to Yield

Unsafe/Unlawful

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8 30 2 24

<u>-</u> 52

163

216

0.1 0.1 0.1 0.1

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298 181 28

203 203 22 217 23 23

925 387 51 355 25

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1-240 SB ENT 1-240 SB ENT 1-240 SB ENT 1-240 SB ENT

COLL-DIST RD M/L COL MERG M/L COL MERG COLL-DIST RD

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BARR-CONCRETE

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No

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REAR-END ROLLOVER

IMP-LN-CHG

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DRY DRY DRY

FOL-CLOSE

DRY

B B B Ē

DARK DARK

DRY

07-12-2011 03-10-2011 09-06-2010 09-30-2009

UNSAF-SPD

FOL-CLOSE

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P

REAR-END

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(70) OKLA. CITY

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(70) OKLA. CITY

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ANGLE-OTHER

UNSAF-SPD DARK

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09-05-2009

REAR-END

FOL-CLOSE

DYLGT

DRY DRY

10-04-2012

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AT: MM 121.41

AT: MM 121.44

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HEAD-ON OTHER REAR-END

UNSAF-SPD FOL-CLOSE INATT

DYLGT DYLGT

DRY DRY

PDO PDO

05-16-2008 08-19-2008 01-26-2011

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REAR-END REAR-END REAR-END

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> IMP-LN-CHG FOL-CLOSE

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F-YIELD

OTHER

05-01-2009 01-02-2009 10-09-2008 09-25-2008 05-05-2008

DRY

PIN PDO

UNSAF-SPD

REAR-END

70 70

#### I-35 I-240 INTERCHANGE

City

# CS

# =

Post

(70) OKLA. CITY

HWY: 1-35

Location

**Highway System Collision Listing** 

Dir.

Dir. MM 121.31

Type of Collision

Unlawful

Lighting Cond.

Roadway

Severity

Date

Cond.

Unsafe

Veh. ĮĪ.

NB EXIT Fat.

**NB EXIT** 





01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

**COLLISION LISTING** 

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 Created: 06/07/2013 by Ken Hess



HWY: I-35

M/L RAMP MRG

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N N 2 AT: MM 121.40 S S 3 4

REAR-END

FOL-CLOSE UNSAF-SPD

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06-04-2009 11-06-2009

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(70) OKLA. CITY 00.66 00.59 00.59

HWY: I-35

**NB EXIT** 

M/L COL GORE

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SIDESWIPE-SAME ROLLOVER

IMP-LN-CHG DARK

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10-22-2010 02-12-2011

UNSAF-SPD FOL-CLOSE UNSAF-SPD

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DARK DARK DYLGT

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10-09-2012

04-18-2011

ROLLOVER

F-0 UTIL-POLE

DYLGT

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01-26-2009

REAR-END

AT: MM 121.38

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REAR-END

IMP-LN-CHG FOL-CLOSE

DYLGT

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03-03-2008 05-06-2008

HWY: I-35

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M/L RAMP MRG RAMP

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F-0 RET-WALL F-0 DROP-OFF

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FOL-CLOSE DYLGT FOL-CLOSE UNSAF-SPD UNSAF-SPD UNSAF-SPD

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#### I-35 I-240 INTERCHANGE

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COLL-DIST RD NO M/L COL MERG NO



# 01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

COLLISION LISTING

(405) 522-0985 Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess

Program Provided by:

**Highway System Collision Listing** 

Dir.

Dir.

Type of Collision

ANGLE-OTHER

FOL-CLOSE F-YIELD

DYLGT

DARK Cond.

DRY

P00 P00

11-02-2011 09-30-2011 Date

02-06-2012

Unlawful Unsafe

Lighting

Roadway Cond.

Severity

REAR-END REAR-END

FOL-CLOSE DYLGT DRY

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SIDESWIPE-SAME REAR-END

IMP-LN-CHG DYLGT

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REAR-END REAR-END

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04-04-2008

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IMP-LN-CHG

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IMP-LN-CHG

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05-26-2011 10-06-2010 06-27-2010 04-09-2010 04-24-2009 11-28-2008

FOL-CLOSE

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(70) OKLA. CITY

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M/L RAMP MRG

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#### I-35 I-240 INTERCHANGE

City

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M/L RAMP GOR
M/L RAMP GOR

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07-16-2008 J 07-17-2008 07-28-2008

PDO

FOL-CLOSE

DYLGT

Cond.

Date

DYLGT

DRY

07-06-2008 07-09-2008

PDO





COLLISION LIST 01-01-2008 Thru 12-1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELI

### Highway System Collision Listing

Features

Dir.

Type of Collision

<u>∓</u>.

HOMA COUNTY	DS TO EASTERN, OKLAHOMA COUNTY
	31-2012
	TING

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 Created: 06/07/2013 by Ken Hess

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(70) OKLA. CITY

HWY: I-35

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M/L RAMP GOR M/L RAMP GOR M/L RAMP GOR

REAR-END ROLLOVER

UNSAF-SPD IMP-LN-CHG

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07-22-2011 07-25-2011

UNSAF-SPD FOL-CLOSE

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10-30-2011 09-09-2011 08-07-2011 07-26-2011

PDO

12-14-2011

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M/L RAMP MRG
M/L RAMP GOR
RAMP

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F-0 RET-WALL

FOL-CLOSE
UNSAF-SPD
IMP-LN-CHG
UNSAF-SPD
UNSAF-SPD
UNSAF-SPD
UNSAF-SPD
UNSAF-SPD

06-20-2010
J 07-28-2010
J 12-01-2010
J 12-18-2010
02-26-2011
04-24-2011
05-20-2011
06-13-2011

PDO PDO PDO PINJ

M/L RAMP GOR

M/L RAMP MRG RAMP

REAR-END
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04-19-2008

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AT: MM 121.53

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BARR-CONCRETE F-0 TRAFF-SIGN

DYLGT

PDO 11-25-2012

#### I-35 I-240 INTERCHANGE

City

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Mile Post 00.83 00.83

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ANGLE-OTHER

ROLLOVER REAR-END

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DYLGT

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DRY DRY 뫄 DR.Y

N-I INJ 06-05-2009

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08-13-2009

ROLLOVER

IMP-LN-CHG

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FOL-CLOSE

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# Highway System Collision Listing

Dir.

Dir. Veh. **⋾**. Fat

Type of Collision

Roadway

Severity

Date

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

> (405) 522-0985 Traffic Engineering Division
> Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess Program Provided by:

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(70) OKLA. CITY

HWY: 1-35

00.86 98.00 00.86

N O NO

SIDESWIPE-SAME

HEAD-ON

REAR-END

FOL-CLOSE

DYLGT

DYLGT

DRY DRY

PDO

11-27-2012 11-20-2012 10-22-2012 10-12-2012 10-03-2012 09-14-2012 09-10-2012

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FOL-CLOSE FOL-CLOSE

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IMP-LN-CHG

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IMP-LN-CHG

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PDO

11-11-2011 02-27-2012 03-26-2012 07-20-2012 08-16-2012

IMP-LN-CHG

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03-25-2011 06-02-2011

FOL-CLOSE UNSAF-SPD

DYLGT DARK

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#### I-35 I-240 INTERCHANGE

City

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# CS

Mile

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NO-IMP-ACT DARK IMP-LN-CHG DYLGT

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FOL-CLOSE DYLGT UNSAF-SPD DYLGT IMP-TURN UNSAF-SPD

11-24-2009

DARK

DRY WET

10-27-2009

REAR-END

REAR-END

FOL-CLOSE DYLGT

DRY DRY DRY WET

PDO

05-19-2011

DARK

REAR-END REAR-END

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PDO PDO PDO PDO 04-21-2011 PDO PDO B B

10-18-2011 10-29-2011 02-25-2012

PRY DRY DRY

03-01-2012

ROLLOVER

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(70) OKLA. (

HWY: 1-35

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IMP-LN-CHG FOL-CLOSE FOL-CLOSE

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09-24-2010 10-13-2010 01-20-2011

REAR-END

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01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

### **Highway System Collision Listing**

Dir. Dir. Veh. **⋽**. Fat

Type of Collision

Roadway Cond.

Severity

Date

Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess Program Provided by:

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P INJ 03-26-2010 PDO 07-14-2010 PDO 09-26-2010

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FOL-CLOSE

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02-18-2008

OTHER

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PDO 11-24-2010

PDO 12-10-2010

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(70) OKLA. CITY

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M/L LOOP MRG

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AT: MM 121.61

ANGLE-OTHER

UNSAF-SPD

DYLGT SNOW

N-I INJ 01-27-2009

REAR-END

INATT

PDO

08-18-2011

FOL-CLOSE
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DYLGT DAWN

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DARK

PDO

04-27-2008 12-10-2009

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COLL-DIST RD

#### I-35 I-240 INTERCHANGE

City

# CS

Mile Post 00.88

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COLL-DIST RD

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Features

Dir.

Dir. Veh. Įnį. Fat.

Type of Collision

FOL-CLOSE

INATT Unlawful Unsafe

DYLGT DYLGT

DRY

Cond.

Severity

Date

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COLL-DIST RD

REAR-END REAR-END

FOL-CLOSE

DARK DYLGT

PDO 04-27-2010 PDO 01-27-2011 N-I INJ 02-18-2011

PDO 10-26-2009 PDO 11-24-2009

UNSAF-SPD

DARK

UNSAF-SPD

DYLGT

뭐 DRY DRY DRY DRY DRY DRY DRY DRY DRY DRY

P INJ

PD0

03-25-2011 06-27-2011 08-29-2011

DRY

PDO

11-03-2011

REAR-END REAR-END REAR-END REAR-END REAR-END

FOL-CLOSE FOL-CLOSE FOL-CLOSE

DYLGT WET

DYLGT

DYLGT

P INJ 05-30-2008
PDO 02-22-2009
PDO 08-27-2009
PDO 09-06-2009
PDO 09-14-2009

F-STOP

DYLGT DYLGT DYLGT

P

OTHER

COLL-DIST RD COLL-DIST RD COLL-DIST RD COLL-DIST RD COLL-DIST RD

COLL-DIST RD

NO NO

COLL-DIST RD

COLL-DIST RD

BARR-CONCRETE

COLL-DIST RD

REAR-END REAR-END

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00.88



01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

**Highway System Collision Listing** 

COLLISION LISTING

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division Program Provided by:

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M/L LOOP MRG M/L LOOP MRG M/L LOOP GOR M/L LOOP MRG M/L LOOP MRG M/L LOOP MRG

LOOP

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REAR-END

REAR-END REAR-END REAR-END HEAD-ON REAR-END REAR-END REAR-END

FOL-CLOSE

DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT DARK DYLGT

DYLGT

PDO 06-17-2008 PDO 06-23-2008 PDO 07-15-2008 PDO 07-16-2008

DRY DRY RY

P INJ 07-22-2008

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INATT ITANI

> DYLGT DYLGT

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PDO

06-13-2008 06-06-2008 06-04-2008 06-04-2008 06-04-2008 05-19-2008 06-03-2008

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M/L LOOP MRG

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P INJ 06-04-2008

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FOL-CLOSE FOL-CLOSE

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NO

(79) OKL 00.94 00.94 00.94 00.94 00.94 00.94 00.94 00.94 00.94 00.94 00.94 00.94 00.94 00.94

M/L LOOP MRG
M/L LOOP MRG
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LOOP
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M/L LOOP MRG

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REAR-END
REAR-END
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FOL-CLOSE

DYLGT
DYLGT
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DYLGT
DARK
DYLGT

DRY DRY DRY DRY DRY DRY DRY

03-10-2008 03-11-2008 03-24-2008 04-05-2008

FOL-CLOSE UNSAF-SPD INATT

04-18-2008 04-26-2008 05-07-2008

#### I-35 I-240 INTERCHANGE

City

# CS

OKLAHOMA

(70) OKLA, CITY

HWY: I-35

19 00.92

00.92 Mile Post 00.92 00.92

M/L LOOP MRG

N N

SIDESWIPE-SAME

IMP-LN-CHG

DYLGT

DYLGT

PDO 04-29-2012 N-I INJ 05-11-2012

Cond.

Cond.

Severity

Date

REAR-END

FOL-CLOSE IMP-LN-CHG UNSAF-SPD

DYLGT

DRY DRY WET

PDO 05-21-2012 PDO 07-25-2012

Features

Dir.

Dir.

Type of Collision SIDESWIPE-OPP REAR-END

Unsafe

Veh. Įnį. Fat.

M/L LOOP MRG NO

19 00.93 19 00.93

19 00.93 19 00.93 19 00.93 19 00.93

N N N N N N

REAR-END REAR-END

ITANI

DYLGT DYLGT

DRY DRY

P INJ 03-27-2012

N-I INJ 10-03-2012

10-13-2012

PINJ 09-03-2010 PINJ 03-24-2012

REAR-END

UNSAF-SPD

DYLGT

DRY

PDO 07-13-2009 PDO 04-09-2010

FOL-CLOSE

OTHER

REAR-END REAR-END

UNSAF-SPD

DYLGT DYLGT

WET

PD0 FAT

03-05-2008 03-01-2008 00.93

M/L LOOP MRG M/L LOOP GOR



**Highway System Collision Listing** 

COLLISION LISTING

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY Created: 06/07/2013 by Ken Hess

Collision Analysis and Safety Branch (405) 522-0985 Traffic Engineering Division Program Provided by:

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### I-35\_I-240 INTERCHANGE





# Highway System Collision Listing

COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 Created: 06/07/2013 by Ken Hess

Part	03-19-2009	PDO	DRY	DYLGT	FOL-CLOSE	REAR-END		2	z	z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
	03-10-2009	PDO	DRY	DYLGT	INATT	REAR-END	H	~		z	NO	M/L LOOP MRG		_	00.94	19	15	70	55
	03-08-2009	PDO	DRY	DYLGT	FOL-CLOSE	REAR-END		2		W	NO	LOOP		_	00.94	19	15	70	55
	03-07-2009	PDO	DRY	DYLGT	OTHER	REAR-END		2		z	ON	M/L LOOP MRG		-	00.94	19	15	70	55
	03-05-2009	PDO	DRY	DYLGT	FOL-CLOSE	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Mail   Mail   Location   Mail   Colo Maria   Mail   No.   No.   Mail   No.   No.   Mail   No.   N	03-05-2009	PINJ	DRY	DYLGT	INATT	REAR-END		2 1		S	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Mail   Mail   Mail   Marie   Mail	03-03-2009	PDO	DRY	DYLGT	INATT	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Mail	02-26-2009	PDO	DRY	DYLGT	INATT	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Mile   Mile   Loedfor   Fabrures   Mile	02-21-2009	PDO	DRY	DYLGT	INATT	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Mile   Mile   Location   Fabrures   Mile	02-16-2009	PDO	DRY	DYLGT	INATT	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int   Mile	02-12-2009	LNI I-N	DRY	DYLGT	FOL-CLOSE	OTHER		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Mile	02-11-2009	PDO	DRY	DYLGT	FOL-CLOSE	REAR-END	H	~		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Mile	02-10-2009	PDO	DRY	DYLGT	INATT	REAR-END		~		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Mile   Mile   Location   Peatures   Mile	01-30-2009	PDO	WET	DYLGT	INATT	REAR-END		2	A	z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Mile   Mile   Location   Features   Mile	01-30-2009	PDO	WET	DYLGT	UNSAF-SPD	REAR-END	H	~		Е	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Mile   Mile   Location   Features   Mile   Dir.	01-29-2009	PDO	WET	DYLGT	UNSAF-SPD	OTHER		3		Z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Mile   Mile   Location   Features   Mil. Dop Mile   Mile	01-08-2009	PDO	DRY	DARK	F-YIELD	REAR-END		2		Z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Post   Mile   Location   Features   M.   Dir.   D	01-08-2009	PDO	DRY	DARK	F-YIELD	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Note	12-12-2008	PDO	DRY	DYLGT	INATT	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Post	12-10-2008	PDO	DRY	DYLGT	INATT	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Post	11-20-2008	PINJ	DRY	DYLGT	INATT	REAR-END		2 1		Z	ON	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Post	11-04-2008	PDO	DRY	DYLGT	INATT	REAR-END	H	2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile	10-30-2008	PDO	DRY	DYLGT	INATT	REAR-END		~		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Location   Features   Int.   Dir.   Mil.   Dir.   Mil.	10-27-2008	PDO	DRY	DYLGT	FOL-CLOSE	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Location   Features   Int.   Dir.	10-21-2008	PDO	DRY	DYLGT	UNSAF-SPD	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Location   Features   Int.   Dir.   Mile   Type of Collision   Unsafe   Lighting   Roadway   Severity   # Post	10-14-2008	PINJ	WET	DYLGT	INATT	REAR-END	$\dashv$	2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Location   Features   Int.   Dir.	09-28-2008	PDO	DRY	DYLGT	INATT	REAR-END	$\dashv$	~		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Location   Features   Int.   Dir.   # #   Type of Collision   Unsafe   Lighting   Roadway   Severity   #   Post   Post	09-22-2008	PDO	DRY	DYLGT	FOL-CLOSE	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Location   Features   Int.   Dir.   Mile   Mile   Type of Collision   Unsafe   Lighting   Roadway   Severity	09-20-2008	PDO	DRY	DARK	INATT	REAR-END	$\forall$	~	$\exists$	z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Location   Features   Int.   Dir.	09-11-2008	PDO	WET	DYLGT	INATT	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Location   Features   Int.   Dir.	09-09-2008	PDO	DRY	DYLGT	FOL-CLOSE	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Location   Features   Int.   Dir.	09-09-2008	PDO	DRY	DYLGT	FOL-CLOSE	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Location   Features   Int.   Dir.	09-07-2008	PDO	DRY	DYLGT	INATT	REAR-END	4	2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.   Mile   Location   Features   Int.   Dir.	09-04-2008	PDO	DRY	DYLGT	FOL-CLOSE	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.         Mile         Location         Features         Int.         Dir.         Dir.         Int.         Dir.         Int.         Int.         Int.         Type of Collision         Unsafe         Lighting         Readway         Severity           ##         Post         Post         Rear-End         Unlawful         Cond.         Cond.         Cond.         Cond.         Cond.         Cond.         PDO           19         00.94         MILLOOP MRG         NO         N         2         1         REAR-END         INATT         DYLGT         DRY         PINJ           19         00.94         MILLOOP MRG         NO         N         N         2         1         REAR-END         INATT         DYLGT         DRY         PINJ           19         00.94         MILLOOP MRG         NO         N         N         2         1         REAR-END         INATT         DYLGT         DRY         PINJ           19         00.94         MILLOOP MRG         NO         N         N         2         1         REAR-END         FOL-CLOSE         DARK         DRY         PDO	09-04-2008	PINJ	DRY	DYLGT	FOL-CLOSE	REAR-END		2		z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.         Mile Post         Location         Features Post         Int.         Dir.         Dir.         Dir.         Int.         Dir.         Int.         Dir.         Int.         Dir.         Int.         Int.         Dir.         Int.         Int.         Dir.         Int.         Dir.         Int.         Dir.         Int.         Dir.         Int.         Dir.         Int.         Int.         Dir.         Int.         Int.         Dir.         Int.         Int.         Dir.         Int.         Dir.         Int.         Dir.         Int.         Int.         Dir.         Int.         Int.         Dir.         Int.         Int	08-21-2008	PDO	DRY	DARK	FOL-CLOSE	REAR-END		2	-	z	NO	M/L LOOP MRG		-	00.94	19	15	70	55
Int.         Mile Post         Location         Features Related 19 00.94         Int.         Dir. Dir. Dir. Dir. Dir. Dir. Dir. Dir.	08-21-2008	PINJ	DRY	DYLGT	INATT	REAR-END		2	20	z	ON	M/L LOOP MRG		-	00.94	19	15	70	55
Int. Mile Location Features Int. Dir. Dir. Wile # # Type of Collision Unsafe Lighting Roadway Severity  # Post Related 1 2 Veh. Inj. Fat. Unlawful Cond. Cond.	08-15-2008	PDO	DRY	DYLGT	INATT	REAR-END	7	2	7	z	NO	M/L LOOP MRG	1	-	00.94	19	15	70	55
Int. Mile Location Features Int. Dir. Dir. # # # Type of Collision Unsafe Lighting Roadway Severity			Cond.	Cond.	Unlawful			9	_		Related				Post	#	#		
	Date	Severity	Roadway	Lighting	Unsafe	Type of Collision	-	$\dashv$	$\neg$		Int.	Features	Location		Mile	Ē	cs	City	Cmty

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M/L LOOP MRG M/L LOOP MRG

REAR-END REAR-END REAR-END REAR-END

UNSAF-SPD

FOL-CLOSE

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06-26-2009 06-29-2009 07-02-2009 07-05-2009 07-09-2009 07-09-2009

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M/L LOOP MRG

M/L LOOP MRG

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MIL LOOP MRG

REAR-END REAR-END REAR-END REAR-END REAR-END

INATT
INATT
F-YIELD

PDO PDO PDO PDO

ANGLE-OTHER
REAR-END
REAR-END
REAR-END
REAR-END

INATT

DYLGT

F-YIELD FOL-CLOSE

05-03-2009 05-04-2009 05-12-2009 05-15-2009 05-18-2009 05-23-2009 05-27-2009 06-04-2009 06-05-2009

REAR-END

FOL-CLOSE INATT

DYLGT DYLGT

DRY

06-17-2009 06-12-2009

DRY

#### I-35 I-240 INTERCHANGE

City

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M/L LOOP MRG

REAR-END

FOL-CLOSE FOL-CLOSE

WET DRY DRY DRY DRY DRY DRY DRY

PINJ

05-02-2009

DRY

PDO

05-01-2009 05-01-2009

Ŋ

04-28-2009

PDO PDO

04-27-2009 04-25-2009

REAR-END REAR-END REAR-END

FOL-CLOSE

ITANI

REAR-END REAR-END REAR-END REAR-END REAR-END

FOL-CLOSE

ITANI

FOL-CLOSE

ITAN

PINJ PIN

04-22-2009

04-20-2009 04-17-2009

FOL-CLOSE

OTHER

M/L LOOP MRG M/L LOOP MRG

M/L LOOP MRG

8 8 Ö Ö S NO

> REAR-END REAR-END REAR-END

> > DYLGT

DRY

04-17-2009 04-16-2009 04-15-2009

DRY

PIN

PDO PDO

DRY DRY DRY

DRY DRY

PDO PDO

04-18-2009



COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Highway System Collision Listing

M/L LOOP MRG

Features

Dir. Dir.

j. # Fat.

Type of Collision

Cond.

Date

M/L LOOP MRG M/L LOOP GOR

> Program Provided by: Traffic Engineering Division Created: 06/07/2013 by Ken Hess Collision Analysis and Safety Branch

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00.94 00.94

00.94 00.94

M/L LOOP MRG M/L LOOP MRG M/L LOOP MRG

HEAD-ON REAR-END

FOL-CLOSE

DYLGT

DRY 罗무무 PRY DRY

PDO

PDO 11-19-2009 PDO 11-19-2009 P INJ 10-30-2009 PBO PBO

10-24-2009 10-23-2009 FOL-CLOSE IMP-BACK

DARK DYLGT

PDO 10-17-2009 PDO 10-20-2009

N-I INJ 10-17-2009

REAR-END REAR-END

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MILLOOP MRG

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REAR-END REAR-END

UNSAF-SPD INATT

DYLGT

DUSK

OTHER

REAR-END

FOL-CLOSE

DYLGT
DARK
DYLGT
DYLGT
DYLGT

08-30-2009
09-02-2009
09-02-2009
09-09-2009
09-09-2009
09-17-2009
09-18-2009
09-24-2009
09-25-2009
1 09-29-2009

FOL-CLOSE

FOL-CLOSE

DYLGT

UNSAF-SPD

F-YIELD

DYLGT DYLGT

10-02-2009 10-02-2009

10-13-2009

UNSAF-SPD FOL-CLOSE FOL-CLOSE

DYLGT DYLGT

FOL-CLOSE

DYLGT DYLGT

DRY DRY DRY DRY DRY DRY DRY DRY DRY

PDO

08-28-2009 08-27-2009 08-23-2009 08-14-2009

08-24-2009

FOL-CLOSE FOL-CLOSE UNSAF-SPD

> DYLGT DYLGT

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#### I-35 I-240 INTERCHANGE

City # CS

19 00.94

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M/L LOOP GOR M/L LOOP MRG

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REAR-END F-0 CURB REAR-END

> FOL-CLOSE FOL-CLOSE

DYLGT

PDO 08-07-2009 PDO 07-31-2009

DYLGT

DYLGT

DYLGT

FOL-CLOSE DYLGT FOL-CLOSE

DRY

PDO 07-30-2009

P INJ 07-27-2009

M/L LOOP MRG

M/L LOOP MRG M/L LOOP MRG M/L LOOP MRG

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M/L LOOP MRG
M/L LOOP MRG
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M/L LOOP MRG M/L LOOP MRG M/L LOOP MRG



01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

COLLISION LISTING

**Highway System Collision Listing** 

M/L LOOP MRG

Features

Dir.

Type of Collision

Unsafe

Severity

Date

FOL-CLOSE

DYLGT

Į. Fat.

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division

Program Provided by:



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00.94 00.94

#### I-35 I-240 INTERCHANGE

City # CS

00.94

00.94 00.94 Mile Post 00.94 00.94

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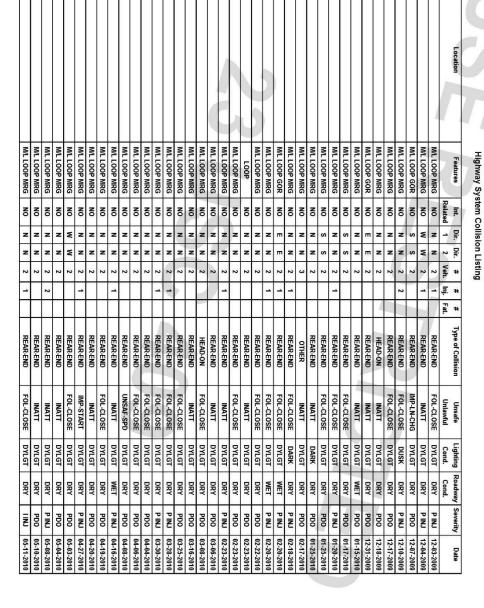


01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division

Program Provided by:

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### I-35\_I-240 INTERCHANGE



COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Highway System Collision Listing

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 Created: 06/07/2013 by Ken Hess

55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55		Cmt	
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00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	Post	Mile	
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M/L LOOP GOR	M/L LOOP GOR WKZONE	M/L LOOP MRG	M/L LOOP GOR	M/L LOOP MRG	M/L LOOP GOR	M/L LOOP MRG		Features																															
NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	ON	NO	ON	NO	ON	NO	NO	Related	ī.												
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NO-IMP-ACT	UNSAF-SPD	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	INATT	INATT	INATT	FOL-CLOSE	INATT	INATT	FOL-CLOSE	UNSAF-SPD	FOL-CLOSE	UNSAF-SPD	IMP-LN-CHG	INATT	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	DEF-VEH	FOL-CLOSE	INATT	INATT	INATT	FOL-CLOSE	INATT	INATT	F-YIELD	IMP-START	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	F-YIELD	Unlawful	Unsafe	
DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DARK	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DARK	DYLGT	Cond.	Lighting													
DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	Cond.	Roadway	
LNI I-N	PDO	PDO	PDO	PDO	PDO	PDO	PDO	PDO	CNI I-N	PDO	PDO	PDO	PDO	PDO	PINJ	PDO	PINJ	PDO	P INJ	PINJ	PDO	PDO	PDO	PDO	PINJ	PDO	CNI I-N	PDO	PDO	PINJ	PDO	PDO	CNI I-N	PDO	PDO	PDO		Roadway Severity	
N-I INJ 10-01-2010	10-01-2010	10-01-2010	09-29-2010	09-18-2010	09-14-2010	09-03-2010	09-03-2010	08-31-2010	08-29-2010	08-27-2010	08-18-2010	08-16-2010	08-12-2010	08-12-2010	08-10-2010	08-06-2010	07-26-2010	07-26-2010	07-26-2010	07-23-2010	07-23-2010	07-22-2010	07-11-2010	06-29-2010	06-28-2010	06-28-2010	06-24-2010	06-24-2010	06-21-2010	06-21-2010	06-21-2010	06-20-2010	06-12-2010	06-10-2010	06-09-2010	05-13-2010		Date	











COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 Created: 06/07/2013 by Ken Hess

# Highway System Collision Listing

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00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	00.94	Post	
M/L LOOP MRG	M/L LOOP MRG	M/L LOOP MRG	LOOP	M/L LOOP MRG	M/L LOOP GOR	M/L LOOP MRG	M/L LOOP GOR	M/L LOOP MRG	M/L LOOP MRG	M/L LOOP MRG	M/L LOOP MRG	M/L LOOP MRG	M/L LOOP MRG	M/L LOOP MRG	M/L LOOP MRG	M/L LOOP MRG	M/L LOOP GOR	M/L LOOP MRG																					
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FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	IMP-LN-CHG	FOL-CLOSE	INATT	INATT	F-YIELD	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	F-YIELD	FOL-CLOSE	INATT	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	IMP-LN-CHG	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	INATT	FOL-CLOSE	INATT	FOL-CLOSE	FOL-CLOSE	INATT	INATT	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	Unlawful	
DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DARK	DYLGT	DYLGT	DARK	DYLGT	DARK	DYLGT	DYLGT	DARK	DYLGT	DARK	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	Cond.	Control Control															
DRY	DRY	DRY	DRY	DRY	WET	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	WET	WET	WET	DRY	DRY	Cond.											
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02-28-2011	02-21-2011	02-15-2011	02-12-2011	02-12-2011	02-11-2011	01-31-2011	01-27-2011	01-16-2011	01-07-2011	12-23-2010	12-23-2010	12-22-2010	12-17-2010	12-17-2010	12-11-2010	12-06-2010	12-04-2010	12-03-2010	12-02-2010	12-02-2010	11-24-2010	11-17-2010	11-17-2010	11-16-2010	11-16-2010	11-13-2010	11-09-2010	11-05-2010	10-27-2010	10-27-2010	10-24-2010	10-23-2010	10-22-2010	10-22-2010	10-22-2010	10-14-2010	10-09-2010		





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PDO 07-23-2011 N-I INJ 07-26-2011

PDO 07-22-2011 PDO 07-22-2011

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#### I-35 I-240 INTERCHANGE

City # CS

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04-19-2011 04-16-2011 04-09-2011 04-01-2011

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FOL-CLOSE

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05-11-2011 05-13-2011

FOL-CLOSE FOL-CLOSE FOL-CLOSE

DYLGT DYLGT

M/L LOOP MRG

M/L LOOP MRG

LOOP

Features

Dir.

Dir. Veh. Į. Fat.

Type of Collision

Unsafe

Severity

Date

DYLGT

Cond.

M/L LOOP MRG M/L LOOP MRG M/L LOOP MRG

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01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

COLLISION LISTING

**Highway System Collision Listing** 

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division

Program Provided by:



FOL-CLOSE UNSAF-SPD FOL-CLOSE FOL-CLOSE



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FOL-CLOSE FOL-CLOSE

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N-I INJ 01-11-2012 PDO 01-19-2012 PDO 02-08-2012 PDO 02-13-2012

DARK

#### I-35 I-240 INTERCHANGE

City # CS

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M/L LOOP MRG

Dir. Veh. Į. Fat.

Type of Collision

Severity

Date

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M/L LOOP MRG

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DARK

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10-13-2011 10-14-2011 10-17-2011

REAR-END

FOL-CLOSE

DYLGT DYLGT

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1-35 FROM 89 ST. S. TO 66 S

COLLISION LISTING

Highway System Collision Listing

01-01-2008 INTU T2-31-2012 5T. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY
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Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess Program Provided by:





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REAR-END REAR-END

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REAR-END HEAD-ON

DYLGT DYLGT

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PDO 07-10-2012 PINJ 07-11-2012

07-12-2012 07-15-2012

DYLGT

W

OTHER
REAR-END
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ANGLE-OTHER
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UNSAF-SPD UNSAF-SPD FOL-CLOSE

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05-06-20172 05-08-20172 05-11-20172 05-11-20172 05-12-20172 05-13-20172 06-13-20172 06-13-20172 06-30-20172 06-30-20172 07-04-20172 07-04-20172

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M/L LOOP

#### I-35 I-240 INTERCHANGE

City # CS

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M/L LOOP MRG

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PDO 03-03-2012

PDO

REAR-END REAR-END

FOL-CLOSE

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04-03-2012 04-06-2012

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PINJ

04-25-2012

05-04-2012

04-23-2012 04-21-2012 O

M/L LOOP MRG

M/L LOOP MRG

Features

Dir.

Dir. Veh. Įnį. Fat.

Type of Collision

Severity

Date

FOL-CLOSE FOL-CLOSE Unsafe

02-14-2012

DYLGT

M/L LOOP MRG

M/L LOOP MRG M/L LOOP MRG

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M/L LOOP MRG

REAR-END REAR-END REAR-END

FOL-CLOSE FOL-CLOSE INATT

DYLGT

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01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

**Highway System Collision Listing** 

COLLISION LISTING

Created: 06/07/2013 by Ken Hess Collision Analysis and Safety Branch Traffic Engineering Division Program Provided by:

M/L LOOP MRG M/L LOOP MRG M/L LOOP MRG

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FOL-CLOSE FOL-CLOSE

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07-24-2012

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1-240 UP

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S S N O

ANGLE-OTHER

FOL-CLOSE FOL-CLOSE

DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT

P INJ 09-22-2008 P INJ 07-29-2008

PDO 10-01-2008

FOL-CLOSE IMP-LN-CHG UNSAF-SPD IMP-LN-CHG

FOL-CLOSE

DRY DRY DRY WET DRY RY RY DRY DRY 문문

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1-240 UP 1-240 UP 1-240 UP

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ANGLE-OTHER

IMP-LN-CHG FOL-CLOSE

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REAR-END REAR-END REAR-END REAR-END

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#### I-35 I-240 INTERCHANGE

City # CS

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Type of Collision

Roadway Cond.

Severity

Date

UNSAF-SPD

DYLGT

DYLGT DUSK Cond.

PBO

P P P

09-29-2012

IIAN Unlawful

FOL-CLOSE

DARK

DRY WET DRY

FOL-CLOSE

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

(405) 522-0985 Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess

Program Provided by:

#### M/L LOOP MRG X-ST BTM TRM Highway System Collision Listing **WKZONE** Features NO NO NO NO NO NO 0 0 0 0 0 0 0 0 0 0 0 0 NO Ö Dir. Dir. Veh. Į. Fat

REAR-END
REAR-END
ANGLE-OTHER
REAR-END

FOL-CLOSE IMP-LN-CHG DEF-VEH

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PDO PDO PDO PDO

FOL-CLOSE

DUSK DYLGT

REAR-END

FOL-CLOSE DYLGT

DRY

PDO 09-27-2008

ANGLE-OTHER

REAR-END

FOL-CLOSE

DYLGT DUSK

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10-29-2012

10-29-2012

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11-17-2012 11-02-2012 REAR-END REAR-END

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PDO

10-17-2012

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12-10-2009

PDO

NEG-DRVING IMP-LN-CHG

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BR ON X-ROAD

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BR ON X-ROAD

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#### I-35 I-240 INTERCHANGE

City

# CS

00.96 Mile Post 00.96 00.96

BR ON X-ROAD X-ST BTM TRM

ON YES Features

Dir. Veh. lnj. Fat.

Type of Collision

Unsafe

Severity

Date

IMP-LN-CHG

Cond.

FOL-CLOSE FOL-CLOSE

PIZ

02-03-2009

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1-240 UP 1-240 UP

X-ST BTM TRM

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SIDESWIPE-SAME

IMP-LN-CHG

DYLGT

PDO 04-24-2009 PDO 05-01-2009

DYLGT

DRY DRY

06-30-2009

08-18-2009

REAR-END

REAR-END HEAD-ON

REAR-END

IMP-LN-CHG

DRY

DRY DRY DRY DRY DRY DRY

PDO 03-13-2009 PDO 03-16-2009

DEF-VEH

DYLGT SNOW
DYLGT DRY DYLGT DYLGT

PDO 03-25-2009 PINJ 03-28-2009 N-I INJ 04-04-2009

FOL-CLOSE FOL-CLOSE FOL-CLOSE FOL-CLOSE

> DARK DARK DARK DYLGT

> > DRY

I INJ 03-06-2009 P INJ 02-25-2009

REAR-END HEAD-ON

1-240 UP I-240 UP I-240 UP 1-240 UP

1-240 UP

BR ON X-ROAD

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00.96 00.96

1-240 UP 1-240 UP 1-240 UP

BR ON X-ROAD BR ON X-ROAD

BARR-CONCRETE

FO

JNSAF-SPD

BR ON X-ROAD

S N O

1-240 UP



# **Highway System Collision Listing**

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division Program Provided by:





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BR ON X-ROAD BR ON X-ROAD BR ON X-ROAD BR ON X-ROAD BR ON X-ROAD

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1-240 UP 1-240 UP

BR ON X-ROAD X-ST BTM TRM BR ON X-ROAD

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BR ON X-ROAD
BR ON X-ROAD

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BR ON X-ROAD BR ON X-ROAD

BR ON X-ROAD BR ON X-ROAD BR ON X-ROAD

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BR ON X-ROAD BR ON X-ROAD

REAR-END ANGLE-OTHER

**NEG-DRVING** 

UNSAF-SPD DEF-VEH

10-22-2010

UNSAF-SPD

DYLGT DYLGT DYLGT DYLGT

FOL-CLOSE DEF-VEH UNSAF-SPD UNSAF-SPD

08-20-2010 08-21-2010 08-24-2010 08-26-2010 J 08-26-2010 09-01-2010 09-02-2010 09-07-2010 09-24-2010

REAR-END REAR-END REAR-END

FOL-CLOSE

DARK DARK DARK DYLGT DYLGT

10-22-2010 10-26-2010

10-22-2010

11-16-2010

FOL-CLOSE IMP-LN-CHG

IMP-LN-CHG

UNSAF-SPD

DYLGT

DYLGT

PDO 01-24-2011 N-I INJ 01-24-2011

UNSAF-SPD UNSAF-SPD FOL-CLOSE

DYLGT DYLGT

DRY DRY DRY

PDO

02-25-2011 05-02-2011

PDO PDO 10-20-2011

09-28-2011 05-25-2011 z

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#### I-35 I-240 INTERCHANGE

City

# CS

# =

70

00.96

1-240 UP

BR ON X-ROAD
BR ON X-ROAD

N N

BR ON X-ROAD BR ON X-ROAD

N N N

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SIDESWIPE-SAME

IMP-LN-CHG

DYLGT DYLGT

N-I INJ 06-17-2010 PDO 06-18-2010

UNSAF-SPD

**NEG-DRVING** 

DYLGT

FOL-CLOSE

FOL-CLOSE

DYLGT DYLGT

DRY DRY DRY DRY

07-12-2010 06-22-2010

00d 00d

06-28-2010

UNSAF-SPD

OTHER

OTHER

BR ON X-ROAD

BR ON X-ROAD

BARR-CONCRETE

F-0

REAR-END

IMP-LN-CHG

DRY DRY

08-17-2010

08-19-2010 08-04-2010 07-30-2010

FOL-CLOSE

PIN

REAR-END REAR-END

I-240 UP 1-240 UP 1-240 UP 1-240 UP I-240 UP

1-240 UP

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19 00.96

00.96 Mile Post 00.96 00.96

BR ON X-ROAD BR ON X-ROAD

NO NO NO

NO NO

Features

Dir.

Dir.

Type of Collision

Unsafe

Severity

Date

Cond.

REAR-END

UNSAF-SPD

DYLGT DYLGT

DYLGT DARK

> 05-18-2010 04-09-2010

IMP-LN-CHG

DRY

PDO

NO-IMP-ACT IMP-LN-CHG

FOL-CLOSE DYLGT

DRY DRY

> P INJ 06-01-2010 N-I INJ 05-27-2010 PDO N-I INJ 05-07-2010

DRY DRY DRY

Veh. lnj. Fat.

00.96



## **Highway System Collision Listing**

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division Program Provided by:



(55) OKLAHOMA 55 70 15

70 15

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01.00 01.00 70 15

19

(70) OKLA. C

CITY

HWY: 1-35

15

9 00.98 (70) OKLA. L

HWY: I-35

OKLAHOMA (70) OKLA. CITY
| 70 | 15 | 19 | 01.01 |

HWY: 1-35

01.01

19 01.01

01.01 01.01

> M/L LOOP GOR M/L LOOP GOR M/L LOOP MRG M/L LOOP MRG

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LOOP

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ANGLE-OTHER F-0 RET-WALL

IMP-LN-CHG

DYLGT

DRY DRY DRY WET

N-I INJ 05-03-2008

DYLGT DARK

P INJ 06-15-2009 PDO 07-02-2008 PDO 04-30-2008

OTHER

REAR-END REAR-END

STER

N<sub>O</sub>

LOOP

8 8

NO NO

AT: MM 121.70

ROLLOVER REAR-END REAR-END

FOL-CLOSE

DYLGT

PINJ

04-28-2008

PDO

01-21-2008

L-CENTER

DYLGT

UNSAF-SPD

DYLGT

အ

FOL-CLOSE

DYLGT

DRY DRY

PDO

10-30-2012

09-05-2012

DYLGT

8 8

z

REAR-END F-O CULVERT

FOL-CLOSE UNSAF-SPD

DYLGT DYLGT

DRY

P INJ

08-19-2008 03-24-2012

z

AT: MM 121.69 s

N N

BARR-CONCRETE
REAR-END
SIDESWIPE-SAME

IMP-LN-CHG

DYLGT DARK

DRY

PD0

11-03-2012

08-05-2010 02-01-2010

F-0

NO-IMP-ACT

DYLGT

88888

REAR-END
REAR-END
OTH-SINGLE-VEH
F-O RET-WALL

NO-IMP-ACT
IMP-LN-CHG
NO-IMP-ACT
SLEEPY

DARK DARK DYLGT DARK

DRY DRY OTHER DRY WET

PDO PDO PDO PDO

12-01-2008 01-30-2009

06-05-2008

5) OKLAHOMA 5 70 15 5 70 15 5 70 15 5 70 15 5 70 15

(70) OKLA. CITY
00.98
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9 00.98

(70) OKLA. CITY 00.97 00.96

HWY: I-35

AT: MM 121.67

MM 121.66,

SIDESWIPE-SAME

IMP-LN-CHG

IMP-LN-CHG

DYLGT

DRY DRY

PDO PDO

12-07-2010

19 00.96 19 00.96 19 00.96 19 00.96 19 00.96

1-240 UP 1-240 UP

BR ON X-ROAD BR ON X-ROAD

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REAR-END REAR-END

FOL-CLOSE

DYLGT

UNSAF-SPD

DYLGT

WET

00d 00d

05-11-2012 05-15-2012

07-11-2012

HEAD-ON

REAR-END

FOL-CLOSE

DYLGT

DRY DRY

P IN.J 08-07-2012 PDO 11-12-2012

12-10-2012

BR ON X-ROAD

NO NO

BR ON X-ROAD BR ON X-ROAD BR ON X-ROAD BR ON X-ROAD BR ON X-ROAD

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SIDESWIPE-SAME ANGLE-OTHER

IMP-LN-CHG

DYLGT

DRY DRY WET DRY DRY

PDO 05-01-2012 PDO 05-07-2012

IMP-LN-CHG

DYLGT

REAR-END REAR-END REAR-END REAR-END

FOL-CLOSE

DYLGT DYLGT

P INJ 04-13-2012 PDO

PDO 05-01-2012

FOL-CLOSE

Cond.

DARK DYLGT

04-09-2012

04-10-2012

FOL-CLOSE

DYLGT DRY

1-240 UP I-240 UP 1-240 UP I-240 UP 1-240 UP 1-240 UP

1-240 UP 1-240 UP

BR ON X-ROAD BR ON X-ROAD 19 00.96 19 00.96

19 00.96

00.96 00.96

BR ON X-ROAD BR ON X-ROAD

N N

Features

Dir.

Type of Collision

Unsafe

Severity

Date

Veh. Įnį. # Fat.

00.96 00.96

#### I-35 I-240 INTERCHANGE

City

# CS



## **Highway System Collision Listing**

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division

Program Provided by:



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(79) OK 91.92 91.92 91.92 91.92 91.92 91.92 91.92 91.92 91.92 91.92 91.92 91.92 91.92 91.92

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### I-35 I-240 INTERCHANGE

Cnty

# CS

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55 55

70 70 70 City

15 15 15

01.01 Mile Post 01.01 01.01

M/L LOOP MRG M/L LOOP GOR

NO

٤ Dir.

REAR-END REAR-END

IMP-LN-CHG

DARK DYLGT

DRY

B B B

PDO

12-03-2011 03-07-2011 10-09-2010 04-28-2010 Cond.

Cond.

Date

INATT Unlawful Unsafe

Veh. Įnį.

Fat.

Type of Collision

Features

Dir.

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15

19 19

01.01

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19

01.01

70 70

01.01

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15 15

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### **Highway System Collision Listing**

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division

Program Provided by:

M/L LOOP MRG
M/L LOOP GOR
M/L LOOP MRG M/L LOOP MRG
M/L LOOP MRG M/L LOOP MRG
M/L LOOP MRG
M/L LOOP MRG M/L LOOP GOR
M/L LOOP GOR M/L LOOP GOR M/L LOOP MRG M/L LOOP GOR M/L LOOP GOR M/L LOOP MRG M/L LOOP GOR M/L LOOP GOR M/L LOOP GOR M/L LOOP MRG M/L LOOP MRG M/L LOOP MRG L00b LOOP NO NO NO NON 8888 S 888 z ٤ ٤ ٤ **8 8 8** E Z ٤ Z Z W W Z Z Z z z 2 F-O GUARDRL-FACE F-O BARR-CONCRETE SIDESWIPE-SAME F-O UTIL-POLE ROLLOVER BARR-CONCRETE BARR-CONCRETE BARR-CONCRETE BARR-CONCRETE F-0 TRAFF-SIGN F-0 POLE-OTHER ANGLE-TURNING F-0 POLE-OTHER F-0 TRAFF-SIGN ANGLE-OTHER RIGHT-ANGLE ROLLOVER REAR-END REAR-END HEAD-ON REAR-END OTHER F-0 OTHER FO F F-0 UNSAF-SPD UNSAF-SPD FOL-CLOSE FOL-CLOSE UNSAF-SPD UNSAF-SPD UNSAF-SPD IMP-LN-CHG IMP-LN-CHG UNSAF-SPD UNSAF-SPD FOL-CLOSE NO-IMP-ACT UNSAF-SPD UNSAF-SPD FOL-CLOSE UNSAF-SPD IMP-TURN UNSAF-SPD NO-IMP-ACT FOL-CLOSE UNSAF-SPD OTHER INAT DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT DARK DYLGT DYLGT DYLGT DYLGT DARK DYLGT DYLGT DYLGT DARK DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT DRY DRY DRY DRY DRY WET DRY DRY DRY WET WET WET DRY DRY WET DRY WET



N-I INJ 07-09-2009 PDO 07-20-2009 PDO 06-04-2009 PDO 06-16-2009

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08-24-2009

N-I INJ 10-31-2009

PDO 04-15-2010

PDO 10-04-2009

P INJ

06-08-2008

06-01-2008 05-13-2008

04-22-2008

PDO

04-23-2009

08-25-2008 03-01-2009

LIN I-N

09-29-2012

PDO PDO

04-28-2012 05-11-2012 09-29-2012



PINJ

03-19-2012 04-03-2012

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01-31-2012

2102-80-20

12-16-2011 01-24-2012

LNI I-N

04-07-2012



01.06 01.06 01.06 01.06 01.06

> COLL-DIST RD COLL-DIST RD COLL-DIST RD COLL-DIST RD COLL-DIST RD

REAR-END REAR-END REAR-END REAR-END REAR-END REAR-END REAR-END REAR-END

FOL-CLOSE

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DYLGT DYLGT DYLGT

PDO

10-07-2009 07-11-2009 FOL-CLOSE FOL-CLOSE FOL-CLOSE FOL-CLOSE FOL-CLOSE

PINJ 06-29-2009 PINJ 07-08-2009

FOL-CLOSE FOL-CLOSE

DRY DRY DRY DRY PRY DRY

PDO 09-10-2010 PDO 04-09-2010

DYLGT DYLGT DYLGT

PDO 11-20-2009 PDO 04-05-2010

COLL-DIST RD

NO No 01.06 01.06

COLL-DIST RD
COLL-DIST RD

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REAR-END REAR-END

FOL-CLOSE IMP-PARK

DYLGT

DRY

PDO

01-16-2011

FOL-CLOSE

DYLGT DYLGT

DYLGT DYLGT

DRY DRY DRY

PD0 PD0 PD0 PD0

05-15-2008 03-08-2008 01-30-2008

DARK

PDO PDO

03-25-2009 09-19-2008

03-22-2009 07-29-2008

COLL-DIST RD

COLL-DIST RD

COLL-DIST RD
COLL-DIST RD
COLL-DIST RD

M/L LOOP MRG M/L LOOP MRG M/L LOOP GOR

NO

### I-35 I-240 INTERCHANGE

City # CS

19 01.02

01.02 Mile Post 01.02 01.02

M/L LOOP GOR M/L LOOP MRG

8

Features

Dir.

Dir. Veh. lnj. Fat.

Type of Collision

Unsafe

Severity

Date

REAR-END REAR-END

IMP-LN-CHG

DARK DYLGT

DRY DRY

PDO

05-15-2010 07-22-2010

PINJ

08-01-2010

Cond.

M/L LOOP GOR

NO

NO

ANGLE-OTHER

F-0 CURB

IMP-TURN

DYLGT

DRY

P INJ 08-17-2010 PDO 08-14-2010

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01.02

01.02 01.02 01.02 01.02

M/L LOOP GOR M/L LOOP MRG

M/L LOOP MRG

LOOP

F-0 UTIL-POLE

UNSAF-SPD UNSAF-SPD UNSAF-SPD FOL-CLOSE

WET

DARK DARK

PD0

01-25-2012 01-22-2012

09-27-2012

DRY DRY

F-O DITCH ROLLOVER

8888888

LOOP

M/L LOOP GOR

M/L LOOP GOR M/L LOOP GOR M/L LOOP GOR M/L LOOP GOR

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F-0 TRAFF-SIGN

UNSAF-SPD IMP-LN-CHG IMP-LN-CHG IMP-LN-CHG IMP-LN-CHG

> DYLGT DYLGT DYLGT DUSK

PDO 08-29-2010 PDO 10-11-2010

REAR-END REAR-END

DARK DYLGT DYLGT

PDO PDO

03-08-2011 03-20-2011 04-14-2011

DARK

DRY DRY DRY WET DRY DRY DRY DRY

P INJ 11-03-2011 N-I INJ 06-28-2011 ANGLE-OTHER

REAR-END

Z

01.02 01.02 01.02

01.02 01.02 01.02 01.02 01.02 01.02 01.02 (70) OKLA. CITY 01.06 01.06 01.06 01.06



**Highway System Collision Listing** 

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

COLLISION LISTING

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division Program Provided by:

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OKLAHOMA (70) OKLA. CITY

HWY: 1-35

HWY: 1-35 HWY: I-35

COLL-DIST RD NO

AT: MM 121.77

F-O EMBANKMENT UNSAF-SPD DARK DRY

P INJ 07-31-2008

AT: MM 121.76

INCIDENT

NO NO

70 15

01.08 01.08 01.08

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01.09

(70) OKLA. CITY

HWY: 1-35

M/L RAMP MRG NO N N 2

REAR-END REAR-END REAR-END

FOL-CLOSE

DYLGT

DRY

INATT

DYLGT

PDO PDO

01-26-2008 01-18-2008

P INJ 03-07-2008 IINJ 03-16-2008

F-O DITCH

UNSAF-SPD IMP-BACK

DRY DRY

DYLGT DYLGT DYLGT

04-04-2008

×

NO NO

z

REAR-END REAR-END

FOL-CLOSE UNSAF-SPD

DARK DYLGT

DRY

PDO

01-30-2008 01-30-2010

AT: MM 121.80

AT: MM 121.78

OTHER OTHER

NEG-DRVING FOL-CLOSE

DYLGT DYLGT

PDO 01-14-2011 핑핑

02-24-2009 02-11-2009

DRY DRY

DYLGT

S

### I-35 I-240 INTERCHANGE

City

# CS

Mile Post 01.06 01.06

70 70 70

19 01.06 19 01.06

70

15

01.06

01.06

01.06

COLL-DIST RD

SIDESWIPE-SAME REAR-END

REAR-END REAR-END REAR-END

FOL-CLOSE

PDO

03-27-2012 04-03-2012

FOL-CLOSE

ITANI

DYLGT DYLGT DYLGT

09-01-2012 06-07-2012

07-14-2012

BARR-CONCRETE

F-0

REAR-END REAR-END

INATT

DYLGT

WET

REAR-END REAR-END

FOL-CLOSE

FOL-CLOSE FOL-CLOSE

DYLGT DYLGT

Cond.

FOL-CLOSE

DYLGT DYLGT

DRY DRY DRY

PDO 05-20-2011
PDO 06-17-2011
PDO 06-22-2011
PDO 07-2-2011
PDO 08-17-2011
PDO 08-17-2011
PDO 09-15-2011
PDO 01-23-2012
PDO 03-13-2012

FOL-CLOSE DYLGT DRY

REAR-END

FOL-CLOSE

DYLGT

NO-IMP-ACT FOL-CLOSE

DARK DARK

DRY DRY DRY

PDO

03-16-2012

F-O UTIL-POLE REAR-END REAR-END

09-16-2012 10-03-2012 11-01-2012 11-16-2012 11-22-2012

IMP-TURN
SLEEPY
FOL-CLOSE
FOL-CLOSE
IMP-LN-CHG
UNSAF-SPD
FOL-CLOSE
FOL-CLOSE

DYLGT
DYLGT
DYLGT
DARK
DARK
DYLGT
DYLGT
DARK
DYLGT
DARK
DARK



### **Highway System Collision Listing**

Features

Dir. Veh. lnj. Fat.

Type of Collision

Unsafe

Date

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

(405) 522-0985 Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess Traffic Engineering Division Program Provided by:

M/L RAMP GOR M/L RAMP MRG M/L RAMP GOR M/L RAMP MRG

No NO NO





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### I-35\_I-240 INTERCHANGE





COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 Created: 06/07/2013 by Ken Hess

# Highway System Collision Listing

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70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 15	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 15	70 15	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1	70 1		ity CS
15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1		15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	-		15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1		_
19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	19 0	_	<u>=</u>
01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	01.11	Post	Mile
																																					1		Location
M/L RAMP GOR	M/L RAMP MRG	RAMP	M/L RAMP MRG	RAMP	M/L RAMP MRG	RAMP	M/L RAMP GOR	M/L RAMP GOR	M/L RAMP MRG	M/L RAMP GOR	RAMP	M/L RAMP GOR	RAMP	RAMP	RAMP	M/L RAMP MRG	M/L RAMP MRG	RAMP	RAMP	M/L RAMP GOR	M/L RAMP MRG	RAMP	RAMP	M/L RAMP MRG	M/L RAMP MRG	M/L RAMP MRG	M/L RAMP MRG	M/L RAMP GOR	M/L RAMP GOR	RAMP	RAMP	M/L RAMP GOR	RAMP	M/L RAMP MRG	RAMP	M/L RAMP GOR	M/L RAMP MRG		Features
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UNSAF-SPD	INATT	FOL-CLOSE	FOL-CLOSE	UNSAF-SPD	OTHER	UNSAF-SPD	D-W-I	NO-IMP-ACT	FOL-CLOSE	UNSAF-SPD	FOL-CLOSE	UNSAF-SPD	UNSAF-SPD	UNSAF-SPD	UNSAF-SPD	INATT	UNSAF-SPD	UNSAF-SPD	INATT	UNSAF-SPD	F-YIELD	FOL-CLOSE	UNSAF-SPD	NO-IMP-ACT	UNSAF-SPD	FOL-CLOSE	INATT	IMP-LN-CHG	I-M-D	FOL-CLOSE	INATT	UNSAF-SPD	FOL-CLOSE	ITANI	NO-IMP-ACT	UNSAF-SPD	UNSAF-SPD	Unlawful	Unsafe
DARK	DYLGT	DARK	DYLGT	DARK	DYLGT	DARK	DARK	DYLGT	DYLGT	DARK	DYLGT	DYLGT	DYLGT	DARK	DYLGT	DYLGT	DARK	DYLGT	DARK	DYLGT	DYLGT	DARK	DARK	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DARK	DYLGT	DYLGT	DARK	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	Cond.	Lighting
DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	WET	WET	DRY	DRY	DRY	WET	DRY	DRY	DRY	DRY	DRY	WET	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	Cond.	Roadway
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08-10-2010	07-26-2010	07-20-2010	07-19-2010	07-09-2010	06-08-2010	05-02-2010	04-25-2010	04-11-2010	02-12-2010	01-24-2010	12-22-2009	11-29-2009	10-06-2009	06-24-2009	06-03-2009	04-27-2009	04-18-2009	04-16-2009	02-08-2009	02-05-2009	01-30-2009	12-29-2008	12-08-2008	11-19-2008	10-09-2008	10-03-2008	09-20-2008	08-30-2008	08-22-2008	08-09-2008	07-31-2008	07-11-2008	07-10-2008	05-22-2008	05-21-2008	05-05-2008	05-01-2008		Date







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01.11 01.11

### I-35 I-240 INTERCHANGE

City # CS

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### **Highway System Collision Listing**

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Created: 06/07/2013 by Ken Hess Collision Analysis and Safety Branch Traffic Engineering Division Program Provided by:

Date

### M/L RAMP MRG M/L RAMP MRG M/L RAMP GOR M/L RAMP GOR M/L RAMP MRG M/L RAMP MRG M/L RAMP GOR M/L RAMP GOR M/L RAMP MRG M/L RAMP MRG M/L RAMP GOR M/L RAMP MRG M/L RAMP MRG M/L RAMP GOR M/L RAMP MRG M/L RAMP GOR M/L RAMP GOR M/L RAMP GOR M/L RAMP MRG M/L RAMP GOR M/L RAMP GOR M/L RAMP GOR M/L RAMP GOR RAMP RAMP RAMP N O 88888 M ž Dir. Veh. lnj. Fat. OTH-SINGLE-VEH REAR-END REAR-END Type of Collision F-0 TRAFF-SIGN ROLLOVER ROLLOVER REAR-END F-O DITCH REAR-END ROLLOVER REAR-END REAR-END RIGHT-ANGLE REAR-END REAR-END ROLLOVER ROLLOVER UNSAF-SPD FOL-CLOSE FOL-CLOSE NO-IMP-ACT UNSAF-SPD FOL-CLOSE UNSAF-SPD INATT UNSAF-SPD UNSAF-SPD UNSAF-SPD FOL-CLOSE FOL-CLOSE FOL-CLOSE FOL-CLOSE FOL-CLOSE FOL-CLOSE UNSAF-SPD UNSAF-SPD UNSAF-SPD UNSAF-SPD F-YIELD DYLGT DYLGT DYLGT DYLGT DARK DYLGT DARK DYLGT DARK DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT DARK DYLGT DYLGT DYLGT DYLGT DARK DARK DYLGT DARK DYLGT DRY 界界界界 DRY DRY DRY DRY DRY DRY DRY 몫 DRY P INJ 09-15-2012 P INJ 09-25-2012 PINJ NH INJ PDO PDO ODD ODD CNI I-N PDO 09-26-2012 PDO 10-25-2012 N-I INJ 05-21-2011 N-I INJ 05-05-2011 PDO PDO PDO P INJ 04-24-2011 P INJ 03-13-2011 PDO 02-27-2011 PDO PDO 11-15-2012 07-02-2012 08-09-2012 08-24-2012 08-14-2011 10-10-2011 11-24-2011 J 12-14-2011 J 02-10-2012 02-22-2012 03-23-2012 04-23-2012 J 05-03-2012 06-01-2011 07-15-2011

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DYLGT

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03-15-2011

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UNSAF-SPD

DYLGT DYLGT DYLGT

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DARK

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WET

PINJ

08-07-2011

REAR-END ROLLOVER REAR-END ROLLOVER

UNSAF-SPD

UNSAF-SPD

F-YIELD

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03-07-2010

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M/L RAMP MRG M/L RAMP MRG

F-O TRAFF-SIGN
SIDESWIPE-SAME
HEAD-ON
F-O RET-WALL
REAR-END
F-O CURB
F-O UTIL-POLE

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07-15-2009 07-27-2009 09-28-2009 03-05-2010

UNSAF-SPD

DEF-VEH

UNSAF-SPD DEF-VEH

P P P P P

12-22-2008 03-18-2009 04-29-2009

07-06-2009 07-08-2009

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M/L RAMP MRG
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BARR-CONCRETE

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**NEG-DRVING** 

DARK DARK

DRY

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P INJ

10-30-2008

12-21-2008

M/L RAMP MRG M/L RAMP MRG M/L RAMP MRG

### I-35 I-240 INTERCHANGE

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City

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Mile Post 01.12

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M/L RAMP MRG M/L RAMP MRG M/L RAMP GOR

Features

Dir.

Dir. Veh. lnj. Fat.

Type of Collision

Unsafe

Severity

Date

Cond.

RAMP

NO N N

RAMP

NO NO

No

F-0 IMPACT-ATTEN F-0 EMBANKMENT

F-0 UTIL-POLE

UNSAF-SPD UNSAF-SPD

D-W-I

N-I INJ 07-25-2008 P INJ 07-07-2008 N-I INJ 06-16-2008 FOL-CLOSE NO-IMP-ACT

DYLGT DARK DYLGT

DRY DRY

05-27-2008 02-04-2008 01-07-2008

DRY

UNSAF-SPD

DRY

PB PB

ROLLOVER REAR-END REAR-END

F-0 TRAFF-SIGN

UNSAF-SPD

DYLGT DYLGT DARK DYLGT DRY DYLGT

PDO 07-27-2008 PDO 08-17-2008 PDO 10-05-2008

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REAR-END F-0 CURB

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### **Highway System Collision Listing**

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division

Program Provided by:

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01.18 01.18 01.18

1-240 NB ENT 1-240 NB ENT 1-240 NB ENT

> M/L COL MERG M/L COL MERG

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M/L COL MERG

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REAR-END OTHER

FOL-CLOSE

DYLGT

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M/L COL MERG

F-0 CURB REAR-END REAR-END REAR-END REAR-END

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PDO 05-21-2009

04-10-2009 12-29-2008 09-16-2008

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PDO PDO

PINJ

04-08-2008

02-13-2008

INATT

OTHER

FOL-CLOSE

DYLGT DYLGT DYLGT

WET WET DRY

PDO PDO

03-08-2010 05-14-2010

FOL-CLOSE

DYLGT DYLGT

DARK

WET

PDO 03-29-2011 PDO 07-06-2011

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### I-35 I-240 INTERCHANGE

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UNSAF-SPD

DYLGT DYLGT

I-M-D

DARK

DRY DRY DRY WET DRY

N-I INJ 05-01-2012
PDO 05-20-2012
PDO 07-04-2012
PDO 07-09-2012
PDO 08-18-2012 PDO 07-04-2012
PDO 07-09-2012
PDO 08-18-2012
PDO 08-18-2012
P INJ 08-27-2012
PDO 10-12-2012

UNSAF-SPD **NEG-DRVING** 

DEF-VEH

DYLGT

FOL-CLOSE

DYLGT

PDO 02-22-2012
PDO 03-31-2012
PDO 04-13-2012

DYLGT DYLGT

RY

HEAD-ON ROLLOVER REAR-END

F-0 UTIL-POLE

F-O UTIL-POLE F-O TRAFF-SIGN

UNSAF-SPD UNSAF-SPD

DYLGT

WET

M/L RAMP MRG

NO NO

M/L RAMP MRG

NO

2

\_ Fat.

SIDESWIPE-SAME

BARR-CONCRETE

F-0

UNSAF-SPD

Unlawful

Lighting Cond.

Cond

Severity

Date

WET

VI I-N

02-03-2012

Unsafe

Features

E.

Dir.

Type of Collision

Dir.

Veh. -# **⋽.** #

M/L RAMP MRG

01.12

HWY: I-35

MM 121.85

BARR-CONCRETE

F-0 UTIL-POLE

UNSAF-SPD

DYLGT DYLGT

DRY

DARK

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F-YIELD

REAR-END F-0 UTIL-POLE

UNSAF-SPD D-W-I FOL-CLOSE UNSAF-SPD

DYLGT DYLGT DARK

DRY DRY

PDO PDO PDO PDO PDO

08-25-2008 11-08-2009

03-18-2008



01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

COLLISION LISTING

**Highway System Collision Listing** 

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division Program Provided by:





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REAR-END SIDESWIPE-SAME

IMP-LN-CHG

OTHER

DYLGT

FOL-CLOSE FOL-CLOSE INATT

DYLGT DYLGT DYLGT

PINJ 01-13-2008
PINJ 03-20-2008
PDD 04-28-2008
PDD 05-03-2008
PDD 05-03-2008
P INJ 06-09-2008
P INJ 06-13-2008
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P INJ 11-20-2008
P INJ 11-21-2008

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F-O UTIL-POLE REAR-END

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UNSAF-SPD

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FOL-CLOSE

DARK DYLGT

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SIDESWIPE-SAME
REAREND
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FOL-CLOSE INATT

DYLGT DYLGT DYLGT

FOL-CLOSE

### I-35 I-240 INTERCHANGE

City

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(70) OKLA. CITY (70) OKLA, CITY

HWY: I-35 SB EXIT

SB EXIT

M/L COL GORE NO S

M/L COL GORE NO S

COLL-DIST RD NO S

NO-IMP-ACT

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DRY

N-I INJ 11-01-2010 PDO 12-21-2010

IMP-LN-CHG

DAWN DUSK

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OTHER

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DYLGT

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PDO

12-07-2008

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AT: MM 4.40 W W 2

REAR-END REAR-END REAR-END REAR-END REAR-END REAR-END REAR-END F-0 DITCH

UNSAF-SPD

DAWN

WET

HWY: I-35

1-240 NB ENT 1-240 NB ENT

M/L RAMP MRG M/L COL MERG

NO N

Dir.

Type of Collision

Unsafe

Lighting Cond.

Roadway

Severity

Date

Cond.

Dir.

Veh. **⋽.** # # Fat.

NO N N 2 1

MM 121.89,

AT: MM 121.88

FOL-CLOSE

DARK DYLGT

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08-02-2012

12-29-2011

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P INJ 02-19-2008

SLEEPY Unlawful

Mile Post 01.18

OKLAHOMA (70) OKLA. 70 15 19 01.20 70 15 19 01.20 70 15 19 01.20

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HOMA (70) OKLA. CITY

HWY: 1-240 HWY: 1-240 HWY: I-240 \*20\*

HWY: 1-240

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F-0 UTIL-POLE

FOL-CLOSE

DYLGT DYLGT

DRY

PDO FNI I-N

11-01-2011



1-35 FROM 89 ST. S.

## Highway System Collision Listing

TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY	01-01-2008 Thru 12-31-2012	COLLISION LISTING
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Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess Program Provided by:

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F-0 TRAFF-SIGN BARR-CONCRETE

UNSAF-SPD

FOL-CLOSE

뭐 뭐 뭐 DRY DRY

> P INJ 07-13-2012 PINJ 07-11-2012

FOL-CLOSE

DYLGT

F-YIELD

DYLGT DARK

PDO 05-29-2012 PDO 05-30-2012 PDO 06-25-2012

05-29-2012 05-30-2012

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REAR-END

UNSAF-SPD

DYLGT
DARK
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FOL-CLOSE FOL-CLOSE FOL-CLOSE

P INJ 02-26-2012

DYLGT

PDO PDO

03-07-2012 04-10-2012

04-29-2012

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FOL-CLOSE
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### I-35 I-240 INTERCHANGE

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01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

COLLISION LISTING

**Highway System Collision Listing** 

Features

Dir. Dir.

Type of Collision

REAR-END HEAD-ON

IMP-LN-CHG

UNSAF-SPD

DARK DYLGT

Unlawful Unsafe

Cond.

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Veh. Įnį. Fat.

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Collision Analysis and Safety Branch Traffic Engineering Division

### Page 36/7



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ANGLE-OTHER

UNSAF-SPD

FOL-CLOSE

DYLGT

DYLGT

PDO

UNSAF-SPD

DYLGT

WET DRY

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03-16-2012 03-11-2012 03-08-2012 03-07-2012

HEAD-ON

REAR-END

REAR-END

FOL-CLOSE

DYLGT

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F-0 BARR-CONCRETE

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OTHER

IMP-LN-CHG

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DARK

PDO

03-16-2008

UNSAF-SPD

REAR-END

UNSAF-SPD FOL-CLOSE

DYLGT

08-17-2012

05-26-2012 05-22-2012 02-14-2010 08-21-2009

DYLGT DARK DYLGT DYLGT

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(55) OKLAHOMA 55 70 71

(70) OKLA. CITY 04.54

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ROLLOVER REAR-END

UNSAF-SPD IMP-LN-CHG

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FOL-CLOSE

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12-11-2012 12-03-2012 11-08-2012

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08-09-2012

HWY: 1-240

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REAR-END
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F-O POLE-OTHER

IMP-LN-CHG UNSAF-SPD FOL-CLOSE

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### I-35 I-240 INTERCHANGE

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City

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Mile Post 04.45 04.45

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SIDESWIPE-SAME REAR-END

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WET

PDO 08-17-2012
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PDO 09-08-2012
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PDO 09-27-2012

FOL-CLOSE FOL-CLOSE

DYLGT

DRY DRY

DYLGT DYLGT

REAR-END REAR-END

BARR-CONCRETE

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09-28-2012 10-23-2012

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DRY DRY DRY

REAR-END F-0

FOL-CLOSE FOL-CLOSE

DYLGT DYLGT

NO-IMP-ACT

WET DRY

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04.45 04.45 04.45



**Highway System Collision Listing** 

Features

Dir.

Dir.

Type of Collision

Unsafe

Lighting Cond.

Severity

Date

Veh. # Inj. Fat. 01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess (405) 522-0985 Traffic Engineering Division Program Provided by:

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OKLAHOMA (70) OKLA. CITY

HWY: 1-240

04.61

(70) OKLA. CITY

HWY: 1-240

70 71

04.57

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(70) OKLA.

HWY: 1-240

70

M/L RAMP MRG

88888

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REAR-END REAR-END HEAD-ON SIDESWIPE-SAME

FOL-CLOSE
UNSAF-SPD
UNSAF-SPD

DYLGT DYLGT DYLGT

DRY DRY WET

02-29-2008 12-16-2009

03-08-2012 03-08-2012 03-11-2012

T: MM 4.55

REAR-END REAR-END

ITANI

REAR-END REAR-END

IMP-LN-CHG IMP-LN-CHG

DYLGT DYLGT

DUSK DARK

DRY DRY NET DRY

PDO PDO

12-15-2011

12-11-2011

N-I INJ 12-17-2011 PDO 06-10-2012

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09-13-2012

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BARR-CONCRETE
REAR-END

F-YIELD

REAR-END ANGLE-OTHER

FOL-CLOSE

DYLGT

UNSAF-SPD

DYLGT DYLGT DYLGT

DRY DRY WET

N-I INJ 06-19-2012
PDO 07-30-2012
PDO 09-29-2012
I INJ 10-12-2012

8 8 8 8

AT: MM 4.56

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IMP-LN-CHG

DYLGT

UNSAF-SPD

DRY

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08-04-2008

UNSAF-SPD

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5) OKLAHOMA
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### I-35 I-240 INTERCHANGE

City 70

71 # CS

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(70) OKLA, CITY

HWY: I-240

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M/L RAMP MRG

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SIDESWIPE-SAME BARR-CONCRETE

IMP-LN-CHG

DARK

FOL-CLOSE

FOL-CLOSE

DYLGT DYLGT

PDO PDO

05-31-2011

07-11-2011 J 09-08-2011

NO-IMP-ACT

DARK

BRIDGE BRIDGE

NO NO NO NO NO

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OTHER REAR-END

FOL-CLOSE UNSAF-SPD

DRY DRY DRY DRY DRY

PDO 10-19-2011 N-I INJ 11-15-2011

DEF-VEH

ROLLOVER REAR-END REAR-END



## **Highway System Collision Listing**

Features

Dir.

Dir.

# Fat.

Type of Collision

Unsafe

Lighting Cond.

Cond.

Severity

F-0

UNSAF-SPD Unlawful

DARK

DRY

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11-29-2012 Date

Veh. **⋽.** #

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01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

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NO 8 O

REAR-END REAR-END REAR-END

ITAN

DYLGT

DRY DRY

PDO

03-31-2008 05-23-2008 02-22-2008

FOL-CLOSE

DYLGT

PIN

IMP-LN-CHG

DYLGT

W W 2

AT: MM 4.60

REAR-END REAR-END REAR-END REAR-END REAR-END

FOL-CLOSE IMP-STOP

DYLGT DYLGT

DRY DRY DRY WET

N-I INJ 08-04-2008
PDO 11-14-2008
PDO 01-17-2009
PDO 07-12-2012
PDO 09-27-2012

FOL-CLOSE

OTHER





15 15 15 15 15

00.01 00.01 00.01

70 70

FR BTN RMP/L FR BTN RMP/L

s

NO

ANGLE-TURNING

REAR-END

IMP-LN-CHG

IMP-TURN

DYLGT

DRY

PBO

03-21-2008

8002-81-20 01-04-2008

DRIVEWAY

FR BTN RMP/L

NO

DRIVEWAY

NO

MM 120.73

ANGLE-TURNING .10 before 89 ST. S. NB ENT

DYLGT

DRY

P INJ 08-26-2009

ANGLE-TURNING

IMP-TURN

DARK

DRY

PDO

W

DRIVEWAY

FR BTN RMP/L

No 8

ANGLE-TURNING

F-YIELD D-W-I

> DYLGT DYLGT

DRY

PDO

07-16-2008

DRIVEWAY

N N

(70) OKLA. CITY (70) OKLA. CITY

HWY: I-35 HWY: I-35

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### I-35 I-240 INTERCHANGE

Cnty

City

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REAR-END F-0

NO

BARR-CONCRETE

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UNSAF-SPD

REAR-END

IMP-LN-CHG FOL-CLOSE

DYLGT DYLGT DYLGT

DRY DRY WET

PDO PDO

03-04-2011 08-09-2011

WET

08-17-2011

UNSAF-SPD

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REAR-END F-O FENCE REAR-END OTHER

FOL-CLOSE DYLGT DRY

FOL-CLOSE FOL-CLOSE

DYLGT

DRY DRY

PDO 05-23-2008 PDO 07-17-2008 PDO 07-25-2008

DARK

DRY

N-I INJ 10-22-2008

PDO 01-18-2009 PDO

02-24-2011

FOL-CLOSE

DYLGT DYLGT

Cond.

70 70

04.65

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SIDESWIPE-SAME BARR-CONCRETE

REAR-END

FOL-CLOSE

DRY

PINJ 09-06-2011 PDO 09-23-2011

11-01-2011

REAR-END OTHER

IMP-LN-CHG IMP-LN-CHG

DYLGT DYLGT DYLGT DAWN

٤

ANGLE-OTHER
REAR-END
REAR-END
OTHER
F-O DITCH
F-O GROUND
OTHER
REAR-END

IMP-LN-CHG
INATT
FOL-CLOSE
FOL-CLOSE
NO-IMP-ACT
NO-IMP-ACT
FOL-CLOSE
INATT

DARK
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT

DRY DRY DRY DRY DRY DRY DRY DRY

01-11-2012 02-27-2012 03-20-2012 04-11-2012 04-17-2012 06-01-2012



## **Highway System Collision Listing**

Features

Dir.

Type of Collision

Unsafe

Date

Veh. Įnį. Fat.

NO W NO W

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

(405) 522-0985 Traffic Engineering Division
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FR BTN RMP/L FR BTN RMP/L

NO

ANGLE-TURNING

REAR-END REAR-END

ANGLE-OTHER

IMP-LN-CHG

DARK

界界界

DARK DYLGT

> N-I INJ 08-29-2009 PDO 09-04-2009

FOL-CLOSE

IMP-TURN

DYLGT

DRY

PDO 11-02-2009 PDO 11-30-2009

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(55) OKLAHOMA 55 70 15

(70) OKLA. CITY 00.10

HWY: 1-35

00.10 00.10 00.10 00.10

00.10

70 15 OKLAHOMA

00.06 (70) OKLA. CITY

HWY: 1-35

NO

AT: MM 120.80, AT: MM 120.78,

00.03 before 89 ST. S. NB ENT .05 before 89 ST. S. NB ENT

D-W-I

DARK DRY

N-I INJ 10-29-2011

REAR-END REAR-END REAR-END

OTHER

IMP-LN-CHG FOL-CLOSE

DYLGT

DRY

N-I INJ 03-28-2011 PDO

12-20-2012

NO NO

z

AT: MM 120.82,

00.01 before 89 ST. S. NB ENT REAR-END

FOL-CLOSE

DYLGT

DRY

PDO

88888

REAR-END ROLLOVER

FOL-CLOSE UNSAF-SPD UNSAF-SPD

DYLGT

P INJ

04-03-2009

PINJ

02-11-2009 12-05-2008

DYLGT DYLGT

DEF-VEH

DARK

DRY DRY DRY

PDO 08-06-2009 PDO 10-06-2009 PDO 02-21-2010 PDO 05-04-2010

DARK

8 8

F-0 GUARDRL-END

NO NO

NEG-DRVING DARK
FOL-CLOSE DYLGT

DRY

PDO

06-09-2011

S

BARR-CONCRETE
REAR-END
00.06 before 89 ST, S, NB ENT

FOL-CLOSE UNSAF-SPD

DYLGT

DRY

P INJ

10-29-2010

DYLGT

DRY

PDO

10-09-2009

ANGLE-TURNING 7 before 89 ST. S. NB EI REAR-END

BARR-CONCRETE

REAR-END

IMP-LN-CHG FOL-CLOSE

DARK

界界界

N-I INJ

03-24-2010 02-27-2009

08-10-2010

DYLGT

PDO

OTHER

DARK

OTHER FO

F-O FENCE

INATT F-YIELD

DARK DYLGT

DRY

PDO

12-26-2011 06-27-2012

8 8

z

HWY: 1-35

80.00

80.00

00.04 (70) OKLA. CITY 00.05 (70) OKLA. CITY

HWY: 1-35

00.02 00.02 (70) OKL 00.04

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70 70

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00.02 00.02 00.02 00.02

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### I-35\_I-240 INTERCHANGE

Cnty

City

# CS # =

15 15

FR BTN RMP/L DRIVEWAY

Int. Related

Dir.

Dir. Veh 2 # <u>,</u> #

Fat

FR BTN RMP/L

NO NO

ANGLE-TURNING ANGLE-TURNING Type of Collision

F-YIELD

DYLGT

PDO PDO

06-07-2010 12-02-2009 Date

IMP-TURN

DARK

Unlawful

Lighting Cond.

Roadway

Severity

Cond.

Unsafe

DRIVEWAY

FR BTN RMP/L

88888

REAR-END REAR-END HEAD-ON

FOL-CLOSE UNSAF-SPD

DYLGT DYLGT

DRY DRY DRY

P INJ 03-16-2011 PDO 04-05-2011 PDO 11-03-2011 PDO 02-24-2012 PDO 06-28-2012

DYLGT

FOL-CLOSE

DYLGT

DRY DRY WET

DEF-VEH

DYLGT

OTHER

70

00.01 00.01 00.01 00.01

70

70 70

00.01 00.01 Mile Post

70

(70) OK

HWY: I-35

FR RD J LEFT

8 8 8 8





01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

**Highway System Collision Listing** 

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00.21

(70) OKLA. CITY

HWY: 1-35

00.21

(70) OKLA. CITY

HWY: I-35

8 8

ON

AT: MM 120.93,

00.06 after 89 ST.SB EX 120

REAR-END HEAD-ON

FOL-CLOSE UNSAF-SPD FOL-CLOSE

DYLGT

DYLGT DUSK DYLGT

RY RY RY RY

PDO 08-27-2008
P INJ 12-15-2008
PDO 01-15-2009
PDO 11-29-2010
PDO 11-30-2010
PDO 04-23-2012
N-I INJ 11-13-2012

F-0 TRAFF-SIGN

FOL-CLOSE UNSAF-SPD

DUSK DYLGT

DRY PDO 11-29-2010

REAR-END

ITANI D-W-I

DYLGT

DRY

PDO

06-29-2012

DARK

DRY

PDO 08-25-2012 PDO 10-22-2012

888888

RIGHT-ANGLE SIDESWIPE-SAME

D-W-I OTHER

DYLGT

OTHER

OTHER D-W-I

DYLGT DARK

RY RY

P INJ 05-14-2008 N-I INJ 04-29-2012

REAR-END

OTHER

NO

00.06 before MM 121

(70) OKLA. CITY

HWY: 1-35

00.20 00.20 00.20 55 70 15 55 70 15 55 70 15 (55) OKLAHOMA 55 70 15 55 70 15 55 70 NK

00.10 00.10 00.10

8 8 8 8 8

(70) OKLA. ( 00.12

HWY: I-35

N O

M

AT: MM 120.84,

00.01 after 89 ST. S. NB ENT REAR-END

OTHER

FOL-CLOSE FOL-CLOSE

DARK

PDO 12-20-2012

ANGLE-OTHER REAR-END

UNSAF-SPD FOL-CLOSE

DARK DYLGT DARK

DRY DRY

SIDESWIPE-SAME

IMP-LN-CHG

DYLGT

DRY DRY DRY DRY DRY DRY

PDO 07-06-2011
PDO 10-20-2011
PDO 12-08-2011
PDO 02-14-2012
PDO 10-01-2012

INATT

DYLGT

INATT

DYLGT DRY

N-I INJ 11-30-2010

REAR-END REAR-END

ANGLE-TURNING 00.02 before 89 ST.SB EX 120

IMP-TURN

DYLGT DYLGT

DRY

PINJ

11-11-2012 08-20-2012

8 8 8

UNSAF-SPD DEF-VEH

DYLGT DARK DYLGT

DRY DRY

CNI I-N FNI d

J 02-28-2011 09-17-2012

00.10

00.10

00.10 00.10 00.10 00.10 Mile Post 00.10

(70) OKLA. CITY
00.13
00.13
00.13
(70) OKLA. CITY
00.15
00.15
00.18
00.18
00.18
00.18

HWY: I-35 89 ST.SB EX 120 89 ST.SB EX 120 HWY: I-35

GOR NO NO

89 ST.SB EX 120
F-O OTRAFF-SIGN
F-O UTIL-POLE
1-03 after 89 ST.SB EX 120
REAR-END
REAR-END
After 89 ST.SB EX 120
REAR-END

DARK DYLGT

DRY

PD0

07-26-2008 04-14-2012

AT: MM 120.87

NO NO

70 15

HWY: I-35

70 70

00.20 00.20 00.20

### I-35 I-240 INTERCHANGE

City # CS # =





**Highway System Collision Listing** 

Features

Dir. Veh. Įnį.

# Fat.

Type of Collision

Unsafe

Date

FOL-CLOSE

DARK

N-I INJ 10-03-2010 PDO 11-13-2010 P INJ 10-18-2010

DYLGT DARK

DYLGT

Cond.

FOL-CLOSE NO-IMP-ACT

NO NO NO S

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

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OKLAHOMA

(70) OKLA, CITY

HWY: 1-35

(70) OKLA. CITY 00.29

HWY: I-35 MM 121 MM 121

**WKZONE** 

S

N N 2

AT: MM 121.02

00.02 after MM 121

BARR-CONCRETE

DYLGT

DRY

PDO

DRY

00.01 after MM 121

REAR-END

ITANI

DARK

DRY

N-I INJ 07-15-2012

F-0 TRAFF-SIGN

NO-IMP-ACT

L-CENTER FOL-CLOSE

CNI I-N

11-05-2011

P 8

NO

70

00.28 00.28 00.28 00.28 00.28 00.28 00.28 00.28 00.28 00.28 00.28

MM 121

REAR END
REAR END
OTHER
F-O FENCE-POLE
OTHER
REAR END

IMP-LN-CHG
INATT
IMP-LN-CHG
UNSAF-SPD
SLEEPY
FOL-CLOSE
FOL-CLOSE
INATT

DARK
DYLGT
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DARK

08-18-2011 08-19-2011 08-22-2011 08-22-2011 08-24-2011 09-22-2011 10-21-2011

70 15

00.30

(70) OKLA, CITY 00.35

HWY: 1-35

00.38 00.35

(70) OKLA. CITY

HWY: I-35

### I-35 I-240 INTERCHANGE

City

# CS # =

Mile Post 00.25 00.25 00.25 00.25

N N N

Dir.

Dir. Veh. Į,

# Fat

Type of Collision

SIDESWIPE-SAME

IIAII Unlawful

Cond.

Cond.

DRY DRY

Roadway

Severity

Date

NO

REAR-END REAR-END REAR-END

FOL-CLOSE

DYLGT DYLGT DYLGT

DRY

PDO 12-18-2009 PDO 11-10-2010 PDO 05-05-2011 P INJ 06-22-2012

FOL-CLOSE DYLGT

DRY

DYLGT DRY

PDO

11-30-2010

PDO

06-16-2008

55 70 15

70 15

OKLAHOMA

70 15

00.28 00.27

(70) OKLA. CITY (70) OKLA. CITY

HWY: I-35 MM 121

HWY: I-35

NO N - 2

AT: MM 121.00,

MM 121

BARR-CONCRETE

OTHER

FOL-CLOSE NO-IMP-ACT OTHER

DRY WET

CNI I-N

ANGLE-OTHER REAR-END SIDESWIPE-SAME

D-W-I

06-19-2011 06-23-2011

DYLGT

DYLGT

뫄

REAR-END

NO

00.28

00.28





Highway System Collision Listing

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY **COLLISION LISTING** 

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NO No NO S

N N

AT: MM 121.07

00.07 after MM 121

REAR-END REAR-END

OTHER

FOL-CLOSE FOL-CLOSE FOL-CLOSE

DARK DYLGT

DRY

PDO

DYLGT

DRY

P INJ 12-22-2011 PDO

08-15-2010 11-05-2011

00.10 after MM 121





(55) OKLAHOMA 70 15

00.42 00.42

00.42 00.40 00.40

(70) OKLA. CITY

HWY: I-35

8 8 8

00.06 before 82 ST. S. OP

REAR-END

FOL-CLOSE DYLGT
FOL-CLOSE DYLGT

DYLGT SNOW
DYLGT DRY

P INJ 01-20-2011 PDO 04-14-2011

UNSAF-SPD

DARK

PDO

06-03-2009

OTHER

REAR-END

DARK

REAR-END

FOL-CLOSE DYLGT
IMP-LN-CHG DYLGT

DRY DRY

PDO 12-03-2009 PDO 10-10-2012 PINJ

08-28-2008

FOL-CLOSE

DYLGT

NO NO

00.44 00.44

(70) OKLA. CITY

HWY: 1-35

HWY: 1-35

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CITY

HWY: I-35

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00.38 00.38 00.38

WKZONE

REAR-END REAR-END

FOL-CLOSE UNSAF-SPD

DYLGT DYLGT

REAR-END

FOL-CLOSE UNSAF-SPD

> DYLGT DYLGT

PDO 09-27-2010 PDO 10-06-2010 PDO 08-28-2010 PDO 09-17-2010

P INJ 10-28-2010

REAR-END

REAR-END

FOL-CLOSE IMP-LN-CHG FOL-CLOSE

DYLGT

UNSAF-SPD

DYLGT

DYLGT DARK

DRY DRY DRY DRY DRY DRY

PDO 03-10-2011 PINJ 05-16-2011 N-I INJ 02-20-2011 I INJ 02-28-2011

REAR-END
ROLLOVER
REAR-END
REAR-END
REAR-END
REAR-END
REAR-END
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REAR-END
REAR-END
REAR-END

FOL-CLOSE
FOL-CLOSE
UNSAF-SPD
IMP-LN-CHG
FOL-CLOSE
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FOL-CLOSE

DYLGT
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DYLGT
DYLGT

PDO 05-20-2011
PDO 06-02-2011
PDO 08-02-2011
PDO 08-23-2011
PDO 09-29-2011
N-I INJ 10-05-2011
PDO 11-09-2011
PDO 02-16-2012
PDO 05-24-2012
PDO 05-24-2012
PDO 08-29-2012
PDO 08-29-2012
PDO 08-29-2012
PDO 08-29-2012
PDO 08-29-2012

00.38 00.38 00.38

00.38 00.38 00.38 Mile Post 00.38

### I-35 I-240 INTERCHANGE

City # CS # =





**Highway System Collision Listing** 

Dir. Veh. lnj. Fat.

Type of Collision

Date

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

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N<sub>O</sub> NO N

UNSAF-SPD UNSAF-SPD

DYLGT

DRY

N-I INJ 06-23-2009

N-I INJ 05-16-2008

DYLGT





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00.49

15 15 70 70

00.49

00.49

. CITY

82 ST. S. OP 82 ST. S. OP

TERM LOC LFT

YES

fter 82 ST. S. OP

REAR-END F-0 OTHER

IMP-TURN

DARK

DRY

PDO

06-20-2010

ANGLE-TURNING

F-YIELD

DYLGT

DRY

PBO

08-25-2008 10-22-2008

REAR-END

FOL-CLOSE

DRY

Ē PINJ

OTHER

FR BTN RMP/L

8 8

DRIVEWAY

88888

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REAR-END REAR-END

UNSAF-SPD FOL-CLOSE

> DYLGT DYLGT

뭐뭐뭐뭐뭐

PDO PDO

04-22-2009 04-24-2009

03-06-2009 01-12-2009 12-01-2008

D-W-I

DARK DYLGT

REAR-END

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FOL-CLOSE

DYLGT

DRY

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05-04-2010

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### I-35 I-240 INTERCHANGE

(55) OKLAHOMA 55 70 15

(70) OKLA. CITY 00.46

HWY: I-35

NO

AT: MM 121.18

Dir.

Dir. Veh. j. # Fat.

Type of Collision

REAR-END

FOL-CLOSE

DYLGT Lighting Cond.

DRY

PDO

05-03-2011

Cond.

Severity

Date

70 15 City

# CS # =

Post 00.45

70 15

55 70 15

(70) OKLA.

HWY: I-35

70 15

00.47 00.47

70 70 15

15

00.47 00.47

70

INCIDENT

8 8 8

z

REAR-END REAR-END

UNSAF-SPD

DRY

PDO

11-12-2008

UNSAF-SPD

BARR-CONCRETE

F-0

DEF-VEH ITANI

DYLGT DUSK

DRY

PDO

02-02-2009 12-19-2008

DYLGT

DRY

PINJ

10.01 before 82 ST. S. OP

88888888

ANGLE-OTHER OTHER

REAR-END

FOL-CLOSE

DYLGT DARK

REAR-END

HEAD-ON

DEF-VEH FOL-CLOSE

DRY

02-06-2009 08-26-2009

REAR-END REAR-END REAR-END REAR-END

IMP-LN-CHG
UNSAF-SPD
OTHER
FOL-CLOSE
FOL-CLOSE
FOL-CLOSE

DARK DYLGT DARK DYLGT

DRY DRY DRY

02-03-2010 05-11-2010 05-13-2010 06-18-2010 03-08-2011 07-19-2012

70 15

00.46 00.46 00.46 00.46

88888

SIDESWIPE-SAME

IMP-LN-CHG FOL-CLOSE UNSAF-SPD

DAWN

DRY DRY

PINJ

09-11-2008 04-08-2009

10-28-2010

REAR-END

HEAD-ON

HEAD-ON

IMP-LN-CHG

DARK

DRY

DYLGT DYLGT

DRY

PDO 06-22-2012 PDO 10-11-2012





### Highway System Collision Listing

COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess (405) 522-0985

Page 44/7:





(55) OKLAHOMA 55 70 15

(70) OKLA. CITY 00.57

HWY: 1-35 HWY: I-35

82 ST. S.SB EXT

M/L RAMP GOR NO S -

AT: MM 121.29,

00.01 after 82 ST. S.SB EXT

F-0 IMPACT-ATTEN

L-CENTER DARK DRY PDO 10-15-2011

NO NO

z

OTHER
OTHER
OTHER
REAR-END
82 ST. S.SB EXT
F.O IMPACT A
'ST.'

FOL-CLOSE

DAWN DARK DYLGT

DRY DRY

PINJ

07-10-2008

N-I INJ 02-08-2009 N-I INJ 08-07-2012

zz

70 15

00.56

70 15

00.57

00.57 00.57 00.57

00.57 00.57

70 15 70 15 70 15 ) OKLAHOMA

00.52 00.52 (70) OKLA. CITY 00.54 00.54 (70) OKLA. CITY

HWY: I-35

NO NO

8 8

ROLLOVER

00.04 after 82 ST. S. OP

REAR-END

F-O

BARR-CONCRETE

OTHER

HEADON

00.02 before 82 ST. S.SB EXT

FOL-CLOSE UNSAF-SPD

DYLGT

DRY

N-I INJ

05-16-2008 03-20-2010

UNSAF-SPD

DYLGT

DRY

N-I INJ

09-19-2008 09-13-2012

UNSAF-SPD UNSAF-SPD

DARK DYLGT

WET

PDO 03-20-2010 N-I INJ 04-24-2011

N N

SIDESWIPE-SAME
00.03 after 82 ST. S. OP
REAR-END

SIDESWIPE-SAME

REAR-END HEAD-ON

IMP-LN-CHG

PDO

11-25-2012 08-13-2012

P INJ 01-19-2012 PDO 09-08-2011

FOL-CLOSE

ANGLE-OTHER REAR-END

FOL-CLOSE

DYLGT

DYLGT DYLGT

N-I INJ 06-12-2010 PDO 08-16-2010 PDO 08-18-2010 PDO 02-11-2011

F-YIELD

DARK DYLGT

DRY DRY DRY DRY

ANGLE-OTHER ANGLE-OTHER

00.50 00.50 00.50 00.50 00.50 00.50 00.50 00.50 00.50 00.50 00.50 00.50 00.50 00.50 00.50 00.50 00.50 00.50

FR RD J LEFT

8 8 8 8 8 8 8

FR RD J LEFT

N O

AT: MM 121.22,

BARR-CONCRETE 00.02 after 82 ST. S. OP

FO

UNSAF-SPD

DYLGT

DRY

PINJ

09-15-2010

Unlawful

Lighting Cond.

Roadway

Severity

Date

Cond.

Unsafe

BARR-CONCRETE

FO

FOL-CLOSE

UNSAF-SPD

DYLGT DYLGT

CE RY

VI I-N PINJ

12-09-2008 05-16-2008

DEF-VEH

DRY

70

### I-35\_I-240 INTERCHANGE

Cnty

City 70

55) OKLAHOMA

(70) OKLA. CITY

HWY: 1-35

15 # CS # =

Post 00.49

70 15

70

15

00.50 00.50



01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

**Highway System Collision Listing** 

Features

Dir.

Dir. Veh. # **⋽.** #

# Fat.

Type of Collision

NO

(405) 522-0985 Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess Program Provided by:

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Ö

88888

F-0 RET-WALL REAR-END REAR-END REAR-END REAR-END

NO-IMP-ACT

DRY DRY DRY

PDO PDO

04-18-2009

02-14-2008

07-28-2009

INATT

DYLGT DYLGT DYLGT DARK

P INJ

02-01-2010

DYLGT

DRY

P INJ 01-24-2011 PDO 06-08-2010

P INJ 12-19-2012

IMP-LN-CHG

IMP-PASS





(55) OKLAHOMA (55) OKLAHOMA 70 15 70 15

(70) OKLA, CITY

HWY: I-35 HWY: I-35

(70) OKLA. CITY

HWY: I-35

NO N N 2

ANGLE-OTHER F-O OTHER

FOL-CLOSE
FOL-CLOSE
FOL-CLOSE
FOL-CLOSE
INATT
IMP-LN-CHG

DYLGT

N-INJ 12-15-2010
PDO 12-18-2011
PDO 06-23-2011
PDO 06-24-2011
PDO 08-8-2011
PDO 09-92-2011
PDO 09-92-2011
PDO 01-01-2012
PDO 03-27-2012
PDO 04-12-2012
PDO 06-25-2012
PDO 07-26-2012
PDO 07-26-2012

REAR-END REAR-END

FOL-CLOSE

FOL-CLOSE

DYLGT DRY

ITANI

DYLGT

DRY

PDO 10-13-2009 PDO 10-08-2010

NO S S 2

AT: MM 121.95, AT: MM 121.94,

00.05 before MM 122 00.05 after SB EXIT

F-0 UTIL-POLE

UNSAF-SPD UNSAF-SPD

DYLGT

DRY DRY

PDO 08-20-2008 N-I INJ 10-29-2011

IMP-LN-CHG

DYLGT DRY

N-I INJ 07-16-2010

P INJ 09-08-2009 PDO

01-26-2009

UNSAF-SPD DYLGT ICE

REAR-END REAR-END 70 15 70

15 00.58 15 00.58 15 00.58 15 00.58 15 00.58 15 00.58 00.58 00.58 00.58 00.58 00.58 00.58 00.58

REAR-END REAR-END SIDESWIPE-SAME

FOL-CLOSE FOL-CLOSE INATT

70 15

01.26 01.26 01.25 01.21

(70) OKLA. CITY

HWY: 1-35

01.28

### I-35 I-240 INTERCHANGE

City

# CS # =

70

70 70

Mile Post 00.58 00.58 00.58 00.58 00.58 00.58 00.58 00.58

70

70

15

00.58

00.58



### **Highway System Collision Listing**

Features

Dir. Veh. lnj. Fat.

Type of Collision

Unsafe

NO NO NO S

F-0 TRAFF-SIGN

8 8 8

BARR-CONCRETE

F-0

FOL-CLOSE DEF-VEH

ROLLOVER OTHER OTHER OTHER

**NEG-DRVING** 

FOL-CLOSE

DYLGT DARK DYLGT

WET

N-I INJ 05-12-2010

DRY DRY DRY DRY WET DRY DRY

PDO

06-02-2010

NEG-DRVING DYLGT DRY

PDO 07-07-2009 PDO 11-07-2009 PDO 11-17-2009 PDO 12-03-2009

IMP-LN-CHG

DYLGT

DEF-VEH FOL-CLOSE

DAWN DARK Cond.

P INJ 06-03-2009 8 8

DYLGT

05-16-2008

Date

01-19-2009

REAR-END

FOL-CLOSE

DYLGT

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess Traffic Engineering Division Program Provided by:

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8 8

S S ON

ĕ O





01.46

(70) OKLA. CITY

HWY: 1-35

S O

AT: MM 122.16,

F-0 BARR-OTHER ANGLE-TURNING

ITANI INATT

DYLGT

OTHER

8 8

REAR-END

IMP-LN-CHG FOL-CLOSE

DYLGT

DYLGT

FOL-CLOSE

DYLGT DUSK

DRY DRY

N-I INJ 07-19-2008 PDO 03-13-2009 PDO 08-03-2009 PDO 01-18-2010

01.47 01.47 01.46 01.46 01.46

FR RD J RITE

N 0 0 0 0 0 0

70 70

01.46

01.46 01.46 01.46

01.42

HWY: 1-35

STR W/INTCHG

NO S

U.02 before 66 ST. S UP

FOL-CLOSE DARK DRY

PDO 03-05-2012

REAR-END HEAD-ON

UNSAF-SPD
FOL-CLOSE
UNSAF-SPD

DYLGT

PINJ

PINJ

01-28-2010 06-23-2009 09-27-2008

REAR-END REAR-END

FOL-CLOSE FOL-CLOSE

DYLGT DYLGT

PDO 03-22-2010
P INJ 08-31-2011
PDO 09-28-2011
PDO 08-10-2012
PDO 10-31-2012

FOL-CLOSE

DARK DYLGT DYLGT

DRY DRY DRY PRY

N O

OTHER

13 after 66 ST. S SB ENT

REAR-END
OTHER
OTHER
6 after 66 ST. S SB ENT

FOL-CLOSE

DARK DYLGT

RY RY

LNI I-N

05-17-2012 10-29-2012

SIDESWIPE-SAME ANGLE-OTHER REAR-END

IMP-LN-CHG
FOL-CLOSE
UNSAF-SPD
INATT

DYLGT DYLGT DYLGT DARK

04-26-2012 06-12-2012 07-16-2012 11-15-2012

04-19-2012

OTHER REAR-END

NEG-DRVING FOL-CLOSE

DYLGT DYLGT DYLGT DYLGT

 DRY
 DRY

 DRY
 DRY

 DRY
 DRY

PDO 07-29-2011 PDO 09-12-2011 PDO 11-26-2011 PDO 02-04-2012

REAR-END REAR-END REAR-END

IMP-LN-CHG UNSAF-SPD IMP-LN-CHG

HWY: I-35

01.38 01.38 01.38 01.38 01.38 01.38 01.38 01.39 01.39 01.39

### I-35 I-240 INTERCHANGE

55) OKLAHOMA

01.38

(70) OKLA, CITY

HWY: I-35

01.38 01.38 01.38

01.38 01.38 01.38

INCIDENT

0 0 0 0 0 0 0 0 0 0 0 0

SIDESWIPE-SAME

IMP-LN-CHG
IMP-LN-CHG

DYLGT

DD0

06-18-2011 07-25-2011

DYLGT

SIDESWIPE-SAME

REAR-END REAR-END REAR-END

FOL-CLOSE

DARK DYLGT DYLGT

WET DRY DRY DRY

PINJ 11-24-2009 PDO 02-04-2010

P INJ 07-17-2010

PDO 09-05-2008 PDO 04-13-2009 PDO 05-11-2009

FOL-CLOSE

01.38 01.38

01.38 01.38 70 15 City # CS # =

01.28



**Highway System Collision Listing** 

Features

Dir.

Type of Collision

Dir. Veh. lnj. Fat.

NO

00.02 after 66 ST. S SB ENT

REAR-END

FOL-CLOSE

DARK

DRY

PDO

11-19-2012

Unlawful Unsafe

Lighting Cond.

Roadway

Severity

Date

Cond.

8 8 8

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess (405) 522-0985 Traffic Engineering Division Program Provided by:

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### I-35\_I-240 INTERCHANGE





COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

### Highway System Collision Listing

Program Provided by:
Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess (405) 522-0985

**ACCESS JUSTIFICATION REPORT** 



03.88 03.88 03.88 03.88 03.88 03.88 03.88 03.88

03.88 03.88 03.88 03.88 03.88 03.88 03.88 03.88 03.88 03.88 03.88 03.88 03.88 03.88

03.88 03.88

03.88 03.88 03.88

03.88 03.88

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### I-35 I-240 INTERCHANGE

City

# CS # =





### **Highway System Collision Listing**

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division

Date

Program Provided by:

SHIELDS UP SHIELDS UP
SHIELDS UP
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SHIELDS UP TERM LOC LFT
TERM LOC LFT TERM LOC RIT TERM LOC LFT
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TERM LOC RIT TERM LOC RIT
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TERM LOC LFT TERM LOC RIT TERM LOC RIT TERM LOC RIT TERM LOC RIT TERM LOC LFT TERM LOC RIT Features | THE YES YES Dir. m & s & s **₹ m** m Dir. Veh. Į. Fat. ANGLE-TURNING
REAR-END
OTHER
REAR-END
RIGHT-ANGLE ANGLE-TURNING ANGLE-TURNING F-0 GUARDRL-END ANGLE-TURNING ANGLE-TURNING SIDESWIPE-SAME ANGLE-TURNING ANGLE-TURNING ANGLE-TURNING ANGLE-TURNING ANGLE-TURNING ANGLE-TURNING Type of Collision RIGHT-ANGLE RIGHT-ANGLE REAR-END REAR-END REAR-END HEAD-ON OTHER OTHER IMP-LN-CHG NEG-DRVING FOL-CLOSE FOL-CLOSE F-YIELD INATT
FOL-CLOSE
IMP-TURN
INATT FOL-CLOSE IMP-LN-CHG FOL-CLOSE FOL-CLOSE FOL-CLOSE IMP-TURN IMP-BACK F-STOP F-YIELD F-STOP F-STOP F-YIELD Unsafe DYLGT DARK DARK DYLGT DYLGT DARK DYLGT DUSK
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DARK
DYLGT
DYLGT
DARK DYLGT DYLGT DYLGT DYLGT DARK DYLGT DARK DYLGT DARK DUSK DYLGT DYLGT HSUJ DRY DRY DRY DRY DRY DRY DRY WET DRY DRY DRY DRY DRY DRY Severity PDO 10-26-2009 PDO 11-06-2009 PDO 12-28-2009 CNI I-N LNI I-N N-I INJ 04-30-2010 N-I INJ 03-02-2010 PINJ PD0 N-I INJ 09-02-2008 8 8 8 8 PDO PDO 05-18-2010 PDO 12-29-2009 PDO PDO 08-02-2008 PD0 PDO 03-19-2010 PDO Ē PDO 8 8 PDO 08-09-2010 PDO 06-24-2010 PDO PDO

08-16-2009 J 08-19-2009 08-27-2009 08-29-2009 09-24-2009 09-30-2009

07-11-2009

07-03-2009

06-05-2009



12-21-2008

10-09-2008

02-25-2009

05-10-2009 05-04-2009 02-23-2009 01-19-2009

01-17-2010

10-24-2009 10-01-2009

10-17-2009



### I-35 I-240 INTERCHANGE

City

# CS # =





### **Highway System Collision Listing**

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division Program Provided by:

### 03.88 SHIELDS UP TERM LOC RIT TERM LOC LFT TERM LOC RIT Features YES YES Dir. ¥ ш т × SES Z Dir. Veh. lnj. Fat. OTHER REAR-END REAR-END REAR-END SIDESWIPE-SAME HEAD-ON REAR-END ANGLE-TURNING ANGLE-TURNING ANGLE-TURNING ANGLE-TURNING ANGLE-TURNING RIGHT-ANGLE ANGLE-OTHER ANGLE-TURNING ANGLE-TURNING Type of Collision ANGLE-TURNING ANGLE-OTHER ANGLE-OTHER RIGHT-ANGLE RIGHT-ANGLE REAR-END F-O CURB HEAD-ON F-0 BR-RAIL REAR-END REAR-END OTHER F-YIELD FOL-CLOSE INATT INATT OTHER IMP-LN-CHG IMP-LN-CHG IMP-LN-CHG FOL-CLOSE OTHER F-YIELD INATI DYLGT DYLGT DARK DYLGT DARK DARK DARK DYLGT DYLGT DARK DUSK OTHER DRY 몫 DRY DRY DRY | DRY DRY DRY DRY DRY DRY DRY DRY WET Severity PDO 01-14-2012 PDO 01-21-2012 PINJ N-I INJ 11-26-2010 N-I INJ 01-01-2012 PD0 P INJ 11-15-2011 PDO PDO PDO PDO PDO PDO PDO 02-20-2012 PDO PDO 07-07-2011 07-08-2011 07-11-2011 07-11-2011 07-27-2011 08-05-2011 08-05-2011 08-17-2011 08-17-2011 08-17-2011 09-07-2011 09-07-2011 11-22-2011 12-27-2011 11-15-2011 06-08-2011 11-30-2010 11-10-2011 06-22-2011 05-25-2011 02-24-2011 02-18-2011 06-03-2011 04-27-2011 11-27-2010 12-19-2010 Date





03.89

REAR-END ANGLE-OTHER

DYLGT DYLGT

DRY

LI I-N

PDO PDO

REAR-END

FOL-CLOSE

DYLGT DYLGT DYLGT DYLGT

DRY DRY DRY DRY DRY

PEPE

11-24-2009

PDO

02-02-2010 01-22-2010 09-17-2009 03-31-2009 03-06-2009 02-26-2009 02-02-2009

P INJ 02-10-2010

FOL-CLOSE FOL-CLOSE FOL-CLOSE

DRY DRY DRY 문 UNSAF-SPD
UNSAF-SPD
UNSAF-SPD
UNSAF-SPD
UNSAF-SPD

70

03.89 03.89 03.89 03.89 03.89 03.89 03.89 03.89 03.89

REAR-END
REAR-END
REAR-END
REAR-END
REAR-END
OTHER

FOL-CLOSE
NO-IMP-ACT
FOL-CLOSE
FOL-CLOSE
FOL-CLOSE
FOL-CLOSE
UNSAF-SPD
UNSAF-SPD
UNSAF-SPD

DYLGT
DARK
DYLGT
DYLGT
DARK

04-05-2008 04-18-2008 04-28-2008 08-15-2008 08-21-2008 10-09-2008 11-22-2008 11-21-2008 11-29-2008

70 70

03.89

03.89 03.89 03.89

03.89

### I-35 I-240 INTERCHANGE

City

# CS # =

03.88 03.88

SHIELDS UP SHIELDS UP SHIELDS UP SHIELDS UP

SHIELDS UP

TERM LOC RIT TERM LOC RIT TERM LOC RIT

RIGHT-ANGLE

REAR-END REAR-END REAR-END

FOL-CLOSE

DYLGT DYLGT DYLGT DYLGT

IMP-LN-CHG IMP-TURN F-STOP

뭐 DRY DRY

PDO 09-21-2012

P INJ 09-19-2012

TERM LOC RIT

YES S E E

TERM LOC RIT

SHIELDS UP SHIELDS UP SHIELDS UP SHIELDS UP

TERM LOC LFT TERM LOC LFT

YES YES

IMP-LN-CHG DYLGT

DYLGT DYLGT Cond.

WET DRY

04-06-2012

FOL-CLOSE DYLGT

DRY DRY

PDO 05-14-2012

PDO 04-23-2012 PDO

DRY

WET

DRY

PDO PINJ PDO N-I INJ 06-27-2012

07-27-2012

07-19-2012

08-28-2012

TERM LOC LFT
TERM LOC RIT

YES

Features

Dir. Dir. Veh. **⋽**. # Fat

Type of Collision

Roadway

Severity

Date

Cond.

03.88 03.88 03.88 03.88 03.88 Post 03.88

03.89

(70) 03.89





COLLISION LISTING 01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EAS

### Highway System Collision Listing

	The control of the co	TERN, OKLAHOMA COUNTY		
Created: 06/07	(405) 522-0985	Collision Anal	Traffic Engine	

Program Provided by: ering Division ysis and Safety Branch

7/2013 by Ken Hess

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PDO



03.90 03.90 03.90 03.90 03.90 03.90

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ANGLE-TURNING

REAR-END REAR-END REAR-END REAR-END

FOL-CLOSE

DYLGT

DYLGT

N-I INJ 02-07-2011

PDO 07-13-2011

P P

F-YIELD

DYLGT DYLGT

DRY DRY DRY DRY

P INJ 08-02-2008 PDO 08-18-2008 PDO 10-15-2009 PDO 10-08-2010

UNSAF-SPD FOL-CLOSE

DYLGT

DYLGT DYLGT

INATT

FOL-CLOSE

70 71 70 70

03.90 03.90

03.89 03.89 (70) OKLA. C

CITY

HWY: 1-240

FR BTN RMP/R

NO NO

M

00.02 after SHIELDS UP SIDESWIPE-SAME REAR-END

IMP-LN-CHG FOL-CLOSE

DYLGT

DRY DRY

PDO

10-29-2012 12-14-2012

SIDESWIPE-SAME

F-YIELD

DRY

PIN

04-29-2008

01-25-2008

FR BTN RMP/L

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8 8 8

REAR-END REAR-END

FOL-CLOSE FOL-CLOSE

DYLGT DYLGT

DRY WET

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06-01-2012 07-25-2012 09-13-2012

DYLGT

REAR-END

DRIVEWAY

09.90

70

03.89 03.89

70

03.89

FR BTN RMP/L DRIVEWAY

≨ m m

ANGLE-TURNING

FOL-CLOSE

REAR-END F-0 CURB

FOL-CLOSE UNSAF-SPD

DYLGT DARK

哥界

PDO

01-27-2012 04-29-2012

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REAR-END REAR-END

OTHER

NEG-DRVING

DYLGT DYLGT

DRY DRY DRY

FOL-CLOSE FOL-CLOSE FOL-CLOSE

DRY DRY WET

10-07-2010

09-03-2010

01-14-2011 01-18-2011 04-25-2011

FR BTN RMP/L

8 8

70

03.89 03.89 03.89 03.89

### I-35 I-240 INTERCHANGE

City

# CS # =

70 70

03.89

03.89 03.89 03.89 Mile Post 03.89 03.89

FR BTN RMP/L

8 8 8

70

03.89 03.89 03.89 03.89

OTHER REAR-END

FOL-CLOSE IMP-LN-CHG

DYLGT DYLGT DYLGT

PINJ 07-28-2010
PINJ 07-30-2010
PDO 08-11-2010
PDO 08-18-2010
PDO 08-30-2010

HEAD-ON REAR-END

UNSAF-SPD UNSAF-SPD DYLGT FOL-CLOSE

DYLGT

DRY DRY DRY DRY DRY

P INJ 06-30-2010 PDO 07-17-2010

DRY

P INJ 06-18-2010

PDO 06-11-2010

05-06-2010

UNSAF-SPD

DYLGT

DARK DYLGT

PDO PDO

FOL-CLOSE

REAR-END

FOL-CLOSE FOL-CLOSE



### **Highway System Collision Listing**

Features

Dir.

Type of Collision

Unsafe

Severity

Date

Cond.

Veh. lnj. Fat. 01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess (405) 522-0985

Program Provided by:

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8 8



03.98

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m &

SIDESWIPE-SAME

IMP-LN-CHG

ROLLOVER REAR-END REAR-END REAR-END

UNSAF-SPD

DARK

DYLGT

I INJ 04-30-2008

UNSAF-SPD FOL-CLOSE

DAWN

DYLGT DYLGT DYLGT DYLGT DYLGT

PDO 03-18-2008
PDO 03-21-2008
PDO 03-21-2008
PDO 04-08-2008
PDO 04-18-2008
PDO 04-24-2008
PDO 04-24-2008
PINJ 04-24-2008
N-1 INJ 04-24-2008

REAR-END REAR-END REAR-END REAR-END

FOL-CLOSE

FOL-CLOSE FOL-CLOSE

70

(70) OKLA. CITY
03.94
03.94
03.94
(70) OKLA. CITY
03.95
(70) OKLA. CITY
03.97
(70) OKLA. CITY
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(70) OKLA. CITY
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03.98
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03.98
03.98
03.98
03.98
03.98

HWY: 1-240

HWY: I-240

NO

00.05 before MM 4

REAR-END
00.04 before MM 4

REAR-END
00.03 before MM 4

REAR-END
REAR-END
REAR-END
REAR-END

FOL-CLOSE

DYLGT DRY

PDO

12-13-2012

WET

PDO

02-04-2008

FOL-CLOSE

DYLGT

DRY

LNI I-N

10-17-2011

DRY

PINJ

01-30-2008

01-12-2008

NO

AT: MM 3.95,

E E 2

AT: MM 3.96,

E E 2

AT: MM 3.97,

NO NO

### I-35 I-240 INTERCHANGE

City # CS # =

Mile Post 03.90 03.90

55) OKLAHOMA

70 71

16.80

03.91 (70) OKLA. CITY

HWY: 1-240

NO NO

OTHER 00.03 after SHIELDS UP

FOL-CLOSE FOL-CLOSE

DARK

DRY

PDO PDO

12-21-2012

11-30-2012

Dir. Veh. lnj.

Fat.

Type of Collision

Unlawful Unsafe

Lighting Cond.

Roadway

Severity

Date

Cond.

NO E E

ANGLE-OTHER

IMP-LN-CHG DYLGT DRY

N-I INJ 01-16-2009 PDO 04-08-2011

DYLGT

NO E E

88888

OTHER REAR-END

OTHER DEF-VEH FOL-CLOSE

DYLGT DYLGT

DRY DRY

PDO PDO PDO

06-30-2008

02-12-2010 11-01-2012

DYLGT

PDO 12-07-2012

REAR-END

(70) OKLA. CITY 03.92

HWY: 1-240

70 71

03.92 03.92 03.92 03.92

HWY: 1-240

888

AT: MM 3.94,

00.06 after SHIELDS UP OTHER

OTHER REAR-END

UNSAF-SPD FOL-CLOSE

DYLGT DYLGT

DRY DRY

PDO LINI

05-14-2010

09-05-2008

HWY: 1-240



### **Highway System Collision Listing**

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess (405) 522-0985 Program Provided by:

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### I-35\_I-240 INTERCHANGE



COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Highway System Collision Listing

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 Created: 06/07/2013 by Ken Hess

55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	$\vdash$	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	55 70	
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03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	03.98	Post
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																															4						Fat.
REAR-END	REAR-END	OTHER	REAR-END	OTHER	OTHER	REAR-END	HEAD-ON	REAR-END	REAR-END	REAR-END	REAR-END	REAR-END	REAR-END	OTHER	REAR-END	OTHER	OTHER	F-0 UTIL-POLE	REAR-END	REAR-END	REAR-END	ROLLOVER	SIDESWIPE-SAME	REAR-END	F-0 BARR-CONCRETE	REAR-END	REAR-END	F-0 UTIL-POLE	REAR-END								
FOL-CLOSE	UNSAF-SPD	NO-IMP-ACT	FOL-CLOSE	IMP-STOP	UNSAF-SPD	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	UNSAF-SPD	UNSAF-SPD	INATT	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	DEF-VEH	FOL-CLOSE	UNSAF-SPD	IMP-LN-CHG	INATT	INATT	UNSAF-SPD	UNSAF-SPD	FOL-CLOSE	UNSAF-SPD	FOL-CLOSE	FOL-CLOSE	INATT	UNSAF-SPD	UNSAF-SPD	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	INATT	Unlawful
DYLGT	DARK	DYLGT	DARK	DARK	DARK	DYLGT	DYLGT	DARK	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DARK	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DAWN	Cond.						
WET	DRY	WET	DRY	WET	DRY	DRY	DRY	DRY	DRY	DRY	WET	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	Cond.													
PDO	PDO	PDO	PINJ	PDO	PDO	PDO	PDO	PDO	PDO	CNI I-N	PDO	PDO	PDO	PDO	LNI I-N	PDO	PINJ	PDO	PDO	PDO	P INJ	LINJ	PDO	PDO	PDO	PDO	PINJ	PDO	PDO	PINJ	PDO	PDO	PINJ	PDO	PDO	PINJ	
02-02-2010	01-05-2010	09-12-2009	07-03-2009	06-29-2009	06-23-2009	06-21-2009	03-13-2009	03-07-2009	02-13-2009	01-21-2009	12-18-2008	11-26-2008	11-26-2008	11-03-2008	10-24-2008	10-20-2008	10-15-2008	10-11-2008	09-30-2008	09-26-2008	09-25-2008	08-30-2008	08-22-2008	08-18-2008	08-17-2008	08-14-2008	08-13-2008	08-12-2008	07-25-2008	06-30-2008	06-26-2008	06-23-2008	06-17-2008	06-13-2008	06-05-2008	05-29-2008	



**ACCESS JUSTIFICATION REPORT** 





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### I-35\_I-240 INTERCHANGE





COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

### Highway System Collision Listing

Created: 06/07/2013 by Ken Hess

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0885

No.   Dec.   D	11-24-2010	-	H	IIIAI I	OTHEN	F	4	H	-	H				_	00.00	F	Н	H	
State   Text	11-17-2010	╀	+	$\perp$	REAR-END	T	,	H	+	╀					03.9	+	+	+	
SS INL Mills         Location         Features         Discriptors         Rained 1         CDL DISC         CDL DISC         CDL DISC         Uniquity         Reader         Uniquity         Reader         Uniquity         Reader         Uniquity         Reader         Uniquity         Cond. Cond.	11-13-2010	+	H		REAR-END		+	10000	+	╀					03.98	+	+	+	5
State   Decision   Endure   Endure   Reduce   Polymer   State   Decision   Decision   Reduce   Polymer	-			$\vdash$	OTH-SINGLE-VEH		_	$\vdash$	+						03.98	-		+	5
No.   No.	11-05-2010		$\vdash$		REAR-END									-	03.9	_			5
R	11-05-2010				REAR-END									-	03.98	1			5
No.   No.	10-21-2010				REAR-END									_	03.98	1			5
Reduction   Redu	-		-		OTHER										03.98	_			5
State   Male   Male   Location   Male   Ma	10-07-2010		Н		REAR-END										03.9	_			5
E INI.         INIA         Lecation         Features         Peatures         Int. Dir. Dir. Dir. Dir. Dir. Dir. Dir. Dir	10-06-2010	0			OTHER										03.9	1	11		5
CS         Int.         Bille         Lecation         Features         Let.         Dir.				9	REAR-END		1	20000							03.98	1	- 20		5
CS         Int.         Mile         Location         Features         Int.	09-28-2010		Н			F	H		Н						03.98	_		Н	5
CS         Ind         Male         Location         Features         Interior         Relation         Interior         Relation         Interior         Relation         Interior         Lighting         Lighting         Cond.	09-28-2010							15000							03.98	_			5
CS         Int.         Mile         Location         Features         Int.         Dir.	09-11-2010		Н		REAR-END	4		A							03.9	_	-	Н	y,
ES         Int.         Mile         Location         Features         Features         Int.         Dir.         Cond.					REAR-END				1	All					03.98	1	31		5
CS         Int.         Mile         Location         Features         Int.         Dir.         Dir.         Dir.         Dir.         Dir.         Fit.         Type of Collision         Unwafe         Lighting         Roadway         Severity           71         9.398         Morris         NO         E         E         2         Morris         Fel. CLOSE         DVLGT         DVLGT <td< td=""><td>-</td><td></td><td></td><td></td><td>SIDESWIPE-SAME</td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>03.98</td><td>1</td><td>-</td><td></td><td>5</td></td<>	-				SIDESWIPE-SAME		1								03.98	1	-		5
CS         Int.         Mille         Location         Features         Int.         Dir.         Dir.         Dir.         Dir.         Dir.         Dir.         Dir.         Dir.         Dir.         Past         Type of Collision         Unsafe         Lighting         Cond.         Dry.         PDO           71         0.338         400         MACONE         R.         2         2         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         0.338         400         MACONE         R.         2         2         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         0.338         400         MACONE         R.         2         2         REAR-END         FOL-CLOSE         DYLGT         DRY         MINU           71         0.338         400         MACON	-				REAR-END				1	1					03.98	_		-	5
CS         Int.         Mile         Location         Features         Int.         Dir.         Dir.         Dir.         Wh.         #         Type of Collision         Unsafe         Lighting         Roadway         Severity           71         0.338         WASS         MASS         WKZONE         NO         E         2         REAR-END         HULLANGU         Cond.	-		$\dashv$		REAR-END		_	b.							03.98	_		$\vdash$	y.
CS         Int.         Mile         Location         Features         Int.         Dir.         Dir.         Dir.         Dir.         Physe of Collision         Unsafe         Lighting         Roadway         Severity           71         0.398         Medical         1         2         Medical         1         Cond.         <	08-16-2010				REAR-END										03.98	_			5
CS         Int.         Mile         Location         Features         Int.         Dir.         #         #         Type of Collision         Unsafe Unlawful Unsafe         Lighting Cond.         Severity Cond.         Cond. </td <td>08-06-2010</td> <td></td> <td></td> <td></td> <td>REAR-END</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>03.9</td> <td>_</td> <td></td> <td></td> <td>S.</td>	08-06-2010				REAR-END										03.9	_			S.
CS         Int. #         Mile         Location         Features         Int. 20ir. 9ir. 9ir. 9ir. 9ir. 9ir. 9ir. 9ir. 9	08-06-2010				REAR-END		-		$\dashv$	-				-	03.98	_	- 10		5
CS         Int.         Mile         Location         Features         Int.         Dir.         Dir.         Dir.         H, bit         H, ppe of Collision         Unsafe Unlawful         Lighting Cond.         Roadway Severity           71         0.3.98         Mose         NO         E         2         Veh.         Inj.         Fat.         Unlawful         Cond.         Cond.         Cond.         PDO           71         0.3.98         Mose         NO         E         E         2         J         REAR-END         FIOL-CLOSE         DYLGT         DRY         PDO           71         0.3.98         Mose         NO         E         E         2         J         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         0.3.98         Mose         NO         E         E         2         J         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         0.3.98         Mose         NO         E         E         2         J         REAR-END         FOL-CLOSE         DYLGT         DRY         PLANU           71         0.3.98         Mose         NO         E         E	_	_			OTHER		Н						4	-	03.98	_	-		5
CS         Int.         Mile         Location         Features         Int.         Dir.         Dir.         Dir.         H, bit         Type of Collision         Unsafe Unsafe Unlawful         Lighting Cond.         Roadway Severity           71         93.98         Most         NO         E         Z         Veh.         Inj.         Fat.         Unlawful         Cond.         Cond.         Cond.         PDO           71         93.98         Most         MAZONE         NO         E         Z         AREAR-END         FIOL-CLOSE         DYLGT         DRY         PDO           71         93.98         MOST         RO         E         Z         Z         REAR-END         FIOL-CLOSE         DYLGT         DRY         PDO           71         93.98         MOST         RO         E         Z         Z         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         93.98         MOST         RO         E         Z         Z         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         93.98         MOST         RO         E         Z         Z         REAR-END         FOL-CLOSE	07-30-2010		+		REAR-END		_								03.98	_		Н	5
CS         Int. Bit         Mile         Location         Features         Int. Dir. Dir. Dir. Dir. Dir. Dir. Dir. Dir	07-12-2010		-		REAR-END			2000		_					03.98	_	0.00		5
CS         Int. Bit         Mile         Logation         Features         Int. Dir. Dir. Dir. Dir. Dir. Dir. Dir. Dir	07-01-2010				REAR-END									-	03.98	1			5
CS         Int.         Mile         Location         Features         Int.         Dir.         Dir.         Dir.         H, Dir. </td <td>06-30-2010</td> <td><math>\dashv</math></td> <td></td> <td></td> <td>REAR-END</td> <td></td> <td></td> <td></td> <td><math>\vdash</math></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td>03.98</td> <td>_</td> <td><math>\vdash</math></td> <td></td> <td>5</td>	06-30-2010	$\dashv$			REAR-END				$\vdash$					-	03.98	_	$\vdash$		5
CS         Int.         Mile         Location         Features         Int.         Dir.         Dir.         Dir.         H, bit         Type of Collision         Unsafe Unsafe Unlawful         Lighting Cond.         Roadway Severity           71         0.3.98         0.3.98         NO         E         E         2         Veh.         Inj.         Fat.         Unlawful         Cond.         Cond.         PDO           71         0.3.98         WKZONE         NO         E         E         2         Y         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         0.3.98         WKZONE         NO         E         E         2         Y         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         0.3.98         WKZONE         NO         E         E         2         Y         REAR-END         HALES         DYLGT         DRY         PDO           71         0.3.98         WKZONE         NO         E         E         2         Y         REAR-END         HALES         DYLGT         DRY         PDO           71         0.3.98         WKZONE         NO         E         E	06-30-2010	$\dashv$	$\neg$		OTHER		+		$\exists$	$\dashv$				-	03.98	_		$\dashv$	5
CS         Int.         Mile         Location         Features         Int.         Dir.         Dir.         Int.         Dir.	$\rightarrow$	4	$\exists$		OTHER		_			$\dashv$					03.98	_	$\dashv$	$\dashv$	5
CS         Int.         Mile         Location         Features         Int.         Dir.         Dir.         Dir.         H         Type of Collision         Unsafe         Lighting         Roadway         Severity           71         03.98         09.94         MNO         E         2         Veh.         Inj.         Fat.         Unlawfill         Cond.         Cond.         Cond.         PDO         PUGT         DRY         PDO         PUGT	-				REAR-END		_			-					03.98	_		-	S.
CS         Int. #         Mile         Logation         Features         Int. Pin. Pin. Pin. Pin. Pin. Pin. Pin. Pin			-	V	REAR-END									-	03.98	_			ري د
CS         Int.         Mile         Location         Features         Int.         Dir.         Dir.         Dir.         Dir.         H         Type of Collision         Unsafe         Lighting         Roadway         Severity           #         #         Post         1         2         Veh.         Inj.         Fat.         Unsafe         Lighting         Roadway         Severity           71         03.98         NO         E         E         2         Y         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         03.98         WKZONE         NO         E         E         2         Y         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         03.98         WKZONE         NO         E         E         2         REAR-END         JUNSAF-SPD         DYLGT         DRY         PDO           71         03.98         NO         NO         E         E         2         REAR-END         JUNSAF-SPD         DYLGT         DRY         PDO           71         03.98         NO         NO         E         E         2         REAR-END         FOL-CLOSE         DYLGT	_				REAR-END				$\dashv$	$\dashv$					03.98	_	$\dashv$	$\dashv$	5
CS         Int. #         Mile         Location         Features         Int. Dir. Dir. #         Dir. Dir. #         #         #         Type of Collision         Unsafe Unsafe Unsafe Unlawful         Lighting Roadway         Severity           71         03.98         03.98         NO         E         E         2         Y         EREAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         03.98         WKZONE         NO         E         E         2         Y         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         03.98         WKZONE         NO         E         E         2         Y         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         03.98         WKZONE         NO         E         E         2         Y         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         03.98         NO         E         E         2         Y         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         03.98         NO         NO         E         E         2         REAR-END         F					REAR-END		_			-					03.98	_		$\vdash$	y.
CS         Int. #         Mile         Location         Features         Int. Pin. Pin. Pin. Pin. Pin. Pin. Pin. Pin	06-02-2010				REAR-END	1				-					03.98	_			5
CS         Int. Mile         Location         Features         Int. Dir. Dir. Dir. Dir. Dir. Dir. Dir. Dir	_		7	4	1		-			-					03.98	_		$\dashv$	5
CS         Int. Mile         Logation         Features         Int. Dir. Dir. Dir. Dir. Dir. Dir. Dir. Dir	04-02-2010		Н	y				ľ	d	1					03.9	_			5
CS         Int.         Mile         Location         Features         Int.         Dir.         Dir.         Dir.         Jir.         Dir.         # # Type of Collision         Unsafe         Lighting         Roadway         Severity           # # Post         Post         Rear-End         1 2 Veh.         Inj.         Fat.         Unlawful         Cond.         Cond.         Cond.           71         93.98         NO         E         E         2         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO           71         93.98         WKZONE         NO         E         E         2         REAR-END         INATT         DYLGT         DRY         PDO	03-18-2010	$\dashv$			REAR-END					7	1			-	03.98	_	100		5
CS         Int.         Mile         Location         Features         Int.         Dir.         Dir.         Dir.         # # # Type of Collision         Unsafe         Lighting         Roadway         Severity           # # Post         # Post         Related         1 2 Veh.         Inj.         Fat.         Unlawful         Cond.         Cond.         Cond.           71         93.98         NO         E         E         2         REAR-END         FOL-CLOSE         DYLGT         DRY         PDO	03-11-2010	-			REAR-END		-	4			MKZONE				03.98	_			5
CS Int. Mile Location Features Int. Dir. Dir. Dir. Dir. Weh. Inj. Fat. Type of Collision Unsafe Lighting Roadway Severity Unlawful Cond. Cond.	03-04-2010	$\dashv$	$\dashv$		REAR-END	V		-				1			03.9	_		$\vdash$	5
CS Int. Mile Location Features Int. Dir. Dir.   #   #   Type of Collision Unsafe Lighting Roadway Severity		nd.	_			_	2007		_	_					_	_	_	10	
		way Severity	-		Type of Collision	#	_		_		Features		Location		_	-	_	nty C	Ç





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### I-35 I-240 INTERCHANGE

City

# CS

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## Highway System Collision Listing

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY **COLLISION LISTING** 

Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess

Program Provided by:

### # = 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 Mile Post 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 **WKZONE WKZONE** N N N N N N N N N N Dir. M т≨ Dir. **&** m m m m m Veh. J. Fat F-O UTIL-POLE OTHER REAR-RND REAR-RND REAR-RND OTHER REAR-RND OTHER REAR-RND BARR-CONCRETE Type of Collision ANGLE-OTHER REAR-END REAR-END REAR-END REAR-END REAR-END FO NO-IMP-ACT FOL-CLOSE FOL-CLOSE FOL-CLOSE IMP-LN-CHG FOL-CLOSE FOL-CLOSE INATT FOL-CLOSE FOL-CLOSE FOL-CLOSE FOL-CLOSE IMP-LN-CHG FOL-CLOSE FOL-CLOSE FOL-CLOSE FOL-CLOSE DYLGT DRY FOL-CLOSE FOL-CLOSE DYLGT FOL-CLOSE FOL-CLOSE DYLGT FOL-CLOSE DYLGT DRY UNSAF-SPD DYLGT FOL-CLOSE DYLGT NEG-DRVING DEF-VEH Unlawful DYLGT DARK Cond. Roadway DRY DRY Cond. | DRY DRY DRY WET DRY DRY DRY DRY P INJ 03-01-2011 N-I INJ 04-07-2011 PDO 04-13-2011 PDO 10-02-2011 PDO 10-16-2011 N-I INJ 11-05-2011 N-I INJ 06-30-2011 N-I INJ 07-05-2011 PDO 07-08-2011 P INJ 07-20-2011 PDO 07-21-2011 P INJ 12-15-2011 P INJ 12-15-2011 PDO Severity N-I INJ 12-30-2011 N-I INJ 01-21-2011 PDO 01-14-2011 PDO 01-27-2012 PDO 01-04-2012 PDO PDO 02-11-2011 PDO 01-06-2011 PDO 07-08-2011 07-20-2011 07-21-2011 07-21-2011 08-04-2011 08-08-2011 08-19-2011 08-27-2011 08-30-2011 09-02-2011 09-14-2011 09-14-2011 05-11-2011 12-23-2010 06-05-2011 Date





03.98 03.98 03.98 03.98

(70) OKLA, CITY

HWY: 1-240

AT: MM 4.00

REAR-END OTHER

FOL-CLOSE

DYLGT

뫄

FOL-CLOSE FOL-CLOSE FOL-CLOSE

DYLGT

DRY DRY

PDO PDO PDO PDO

09-16-2011 08-14-2009

09-20-2011 08-14-2009

FOL-CLOSE

DYLGT DYLGT DYLGT

MM 4

MM 4 MM 4 MM 4

888888

03.98 03.98

FOL-CLOSE FOL-CLOSE

FOL-CLOSE

11-12-2012 11-13-2012

11-27-2012

03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98 03.98

REAR-END

DYLGT
DYLGT
DYLGT
DARK
DYLGT

09-18-2012 09-27-2012 10-09-2012 10-23-2012 10-26-2012 11-02-2012 11-02-2012 11-10-2012

UNSAF-SPD
INATT
FOL-CLOSE
FOL-CLOSE
INATT

FOL-CLOSE FOL-CLOSE

08-28-2012 09-13-2012

UNSAF-SPD FOL-CLOSE UNSAF-SPD

### I-35 I-240 INTERCHANGE

City # CS # =

Mile Post 03.98 03.98

03.98 03.98 03.98 03.98

03.98 03.98

8 8 8

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FOL-CLOSE

DYLGT

PDO

08-02-2012

07-26-2012

FOL-CLOSE

DYLGT

DRY DRY DRY DRY

DYLGT

PDO PDO PDO FOL-CLOSE FOL-CLOSE

DYLGT DYLGT

DRY DRY FOL-CLOSE DYLGT

DRY

P INJ 07-19-2012 N-I INJ 06-13-2012

DRY DRY DRY

03.98 03.98 03.98



Highway System Collision Listing

Dir.

Type of Collision

Unlawful

Roadway

Severity

Date

Į. Fat 01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY **COLLISION LISTING** 

Traffic Engineering Division Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess

Program Provided by:

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(55) OKLAHOMA 70 71

(70) OKLA. CITY 04.06

04.05

(70) OKLA. CITY 04.07

HWY: 1-240 HWY: I-240

04.07

BYERS/REF BYERS/REF BYERS/REF BYERS/REF

04.07

RAMP

88888

N<sub>O</sub> NO

AT: MM 4.07 AT: MM 4.06,

BYERS/REF
ANGLE-TURNING 00.01 before BYERS/REF
ANGLE-TURNING

ANGLE-TURNING ANGLE-TURNING

> IMP-TURN IMP-TURN IMP-TURN

OTHER

DYLGT DYLGT DYLGT

RY RY RY

PDO

10-27-2010 08-16-2010

B

DYLGT

PD0

DRY

DYLGT

04.07

(70) OKLA. CITY

04.00 KLA. CITY
04.01 (70) OKLA. CITY
04.02 (70) OKLA. CITY
04.02 (70) OKLA. CITY
04.05 (70) OKLA. CITY

HWY: 1-240

HWY: 1-240

NO

F-O CULVERT

00.02 after MM 4

REAR-END

00.02 before BYERS/REF

REAR-END

DYLGT

DRY

CNI I-N

04-01-2011

MM 4 REAR-END

DYLGT

DRY RY

PINJ

PDO

DARK

AT: MM 4.02,
E S S E S E S S E S E S S E S E S S E S E S S E S E S S E S

N N N N N N N N

REAR-END
SIDESWIPE-SAME
OTHER
REAR-END
REAR-END
REAR-END
REAR-END

INATT
IMP-LN-CHG FOL-CLOSE UNSAF-SPD

REAR-END REAR-END REAR-END

IMP-LN-CHG

DYLGT DYLGT DYLGT

02-02-2012 05-04-2010 05-04-2010 03-12-2010

09-03-2011

DYLGT

DRY

N-I INJ 05-23-2011

P INJ 06-04-2010

IMP-LN-CHG

FOL-CLOSE

DRY DRY DRY DRY DRY DRY DRY

12-20-2008 12-05-2009 03-03-2010

07-17-2008 07-24-2008

DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DARK
DYLGT
DARK
DYLGT

### I-35 I-240 INTERCHANGE

City # CS # =

Mile Post 04.00

MM 4 MM 4

04.00 04.00 04.00 04.00 04.00

REAR-END REAR-END

FOL-CLOSE DUSK FOL-CLOSE NO-IMP-ACT DYLGT DRY FOL-CLOSE DYLGT

DYLGT

P INJ 12-11-2011 PDO 12-02-2011 P INJ 11-16-2011

PDO 12-08-2011

FOL-CLOSE FOL-CLOSE

DARK DYLGT

DRY DRY DARK Cond.

DRY DRY

FOL-CLOSE

Unlawful

Roadway

Severity

Date

Cond.

REAR-END

FOL-CLOSE

DRY DRY

PINJ PDO

12-16-2011 12-21-2011 12-15-2011

DYLGT DYLGT

PDO

REAR-END ANGLE-OTHER

04.00 04.00 04.00 04.00

04.00





01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

**COLLISION LISTING** 

### Highway System Collision Listing

Dir. Veh. Į.

Fat

Type of Collision

Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess Program Provided by:

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04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08

### I-35 I-240 INTERCHANGE

City # CS # =

04.08 04.08 04.08 04.08

04.08 04.08 04.08 04.08 04.08 Mile Post 04.08





### **Highway System Collision Listing**

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess

Program Provided by:

Features 8 8 8 8 Dir. Į. Fat. REAR-END SIDESWIPE-SAME SIDESWIPE-SAME Type of Collision OTHER
REAR-END
REAR-END
REAR-END
REAR-END
REAR-END
OTHER
REAR-END
REAR-END
OTHER
REAR-END
REAR-END
REAR-END
REAR-END
REAR-END
REAR-END REAR-END REAR-END REAR-END REAR-END FOL-CLOSE FOL-CLOSE
FOL-CLOSE
FOL-CLOSE
FOL-CLOSE
UNSAF-SPD
FOL-CLOSE
UNSAF-SPD
UNSAF-SPD
FOL-CLOSE FOL-CLOSE FOL-CLOSE FOL-CLOSE FOL-CLOSE FOL-CLOSE UNSAF-SPD FOL-CLOSE FOL-CLOSE UNSAF-SPD UNSAF-SPD FOL-CLOSE Unsafe DYLGT DYLGT
DYLGT
DYLGT
DYLGT DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT DYLGT DYLGT DYLGT DARK DYLGT DYLGT DYLGT DYLGT DARK DYLGT DRY DRY DRY DRY DRY DRY DRY 뭐 DRY DRY DRY DRY PDO 06-09-2008
N-I INJ 07-03-2008
N-I INJ 08-01-2008
PDO 08-01-2008
N-I INJ 08-01-2008
P INJ 08-22-2008
N-I INJ 08-22-2008
P INJ 08-22-2008
PDO 09-18-2008
PDO 10-01-27-2008
PDO 10-01-27-2008
PDO 10-01-2008 PDO 10-18-2008 P INJ 10-22-2008 PDO 10-22-2008 PDO 10-23-2008 PDO 03-21-2008 PDO 04-01-2008 PDO 04-02-2008 PDO 04-04-2008 PDO 04-10-2008 PINJ 10-08-2008



N-I INJ 04-24-2008 P INJ 04-10-2008

04-14-2008

PDO

05-17-2008 05-23-2008

N-I INJ 03-12-2008

PDO PDO 03-07-2008

02-14-2008

Severity

Date



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### I-35\_I-240 INTERCHANGE

70 70 70

City # CS





COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

### Highway System Collision Listing

Program Provided by:
Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess (405) 522-0985

04.08	04.08		04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	Post	Mile
																							)														1		Location
																																			1	4			Features
	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	ON	NO	Related	Int.																					
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1 1	п	Е	Е	Е	Е		Е	Е	Ε	Е	Е	Е	Е	Е	Э	E	Е	Е	Е	Е	Е	п	Е	Е	Е	¥	ш	п	п	Е	Е	ш	Е	ш	Е	ш	Е	2	Dir.
ه (	۵	2	3	2	2	_	4	2	2	2	3	2	2	2	2	2	2	2	4	2	3	2	3	မ	2	2	2	2	2	2	2	2	2	2	3	2	2	Veh.	#
	۵	2	1					2000	5	1	2			1	2	1	3		1	4	3											_				3		Į.	#
																																4						Fat.	#
DEAD-END	DEAD-END	REAR-END	REAR-END	REAR-END	REAR-END	F-0 UTIL-POLE	REAR-END	REAR-END	REAR-END	REAR-END	OTHER	REAR-END	ANGLE-OTHER	REAR-END	REAR-END	REAR-END	REAR-END	REAR-END	OTHER	REAR-END	REAR-END	OTHER	HEAD-ON	REAR-END	100	Type of Collision													
FOL-CLOSE	TTANI	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	UNSAF-SPD	UNSAF-SPD	UNSAF-SPD	FOL-CLOSE	INATT	ITANI	UNSAF-SPD	TTANI	IMP-LN-CHG	FOL-CLOSE	ITANI	UNSAF-SPD	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	UNSAF-SPD	FOL-CLOSE	NO-IMP-ACT	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	INATT	UNSAF-SPD	FOL-CLOSE	INATT	IMP-LN-CHG	UNSAF-SPD	INATT	INATT	INATT	FOL-CLOSE	UNSAF-SPD	UNSAF-SPD	Unlawful	Unsafe
DYLGT	DVI GT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DARK	DYLGT	DYLGT	DYLGT	DYLGT	DARK	DARK	DARK	DYLGT	DYLGT	DYLGT	DYLGT	Cond.	Lighting
DRY	nav	DRY	DRY	DRY	DRY	WET	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	WET	DRY	Cond.	Lighting Roadway Severity																				
_		CNI I-N	CNI I-N	PD0	PDO	PDO	PDO	PDO	PDO	CNI I-N	LNI I-N	PDO	PDO	CNI I-N	LNI	P INJ	PINJ	DOG	LNI d	CNI I-N	PINJ	PDO	PINJ	PDO	PDO	PDO	PINJ	PDO		Severity									
02-14-2011	11_30_2010	11-19-2010	11-18-2010	11-18-2010	11-05-2010	09-08-2010	09-07-2010	08-25-2010	08-21-2010	08-10-2010	08-05-2010	07-23-2010	07-22-2010	07-20-2010	07-19-2010	07-01-2010	06-30-2010	06-11-2010	06-09-2010	06-08-2010	06-03-2010	02-26-2010	02-05-2010	01-17-2010	12-23-2009	12-05-2009	07-16-2009	07-03-2009	02-19-2009	02-16-2009	01-16-2009	01-09-2009	12-05-2008	12-04-2008	11-23-2008	11-15-2008	11-15-2008		Date



OLSSON ®



04.12 04.12 04.12 04.12 04.12 04.12

SHIELDS EB ENT SHIELDS EB ENT SHIELDS EB ENT SHIELDS EB ENT

M/L RAMP MRG M/L RAMP MRG

NO

MIL RAMP MRG
MIL RAMP MRG
MIL RAMP MRG

8 8 8 8 8 8

04.12

55 70 71 (55) OKLAHOMA

(70) OKLA. CITY . CITY

70

SHIELDS EB ENT

M/L RAMP MRG

RAMP

M/L RAMP MRG

NO

AT: MM 4.12,

SHIELDS EB ENT

F-0 UTIL-POLE

NO-IMP-ACT

DYLGT

PDO

11-11-2008

DRY DRY

P INJ 08-01-2008

PINJ

05-05-2008

REAR-END REAR-END

REAR-END

UNSAF-SPD

DRY DRY DRY

PINJ 12-05-2008
PDO 03-19-2009
PDO 02-11-2010
PDO 04-30-2010

DYLGT DYLGT DARK DYLGT DYLGT DYLGT DYLGT DYLGT

N-I INJ 07-29-2011 P INJ 06-10-2010 F-YIELD

INATT INATT

OTHER

after SHILEDS WB EXIT

ROLLOVER

UNSAF-SPD

DYLGT

RY RY

PDO 08-25-2012 N-I INJ 11-24-2012

DRY

N-I INJ 12-11-2008

SHIELDS EB ENT HWY: 1-240

SHILEDS WB EXIT HWY: 1-240 HWY: I-240 SHILEDS WB EXIT

M/L RAMP GOR

NO NO

W

OTHER

WB EXIT

REAR-END

REAR-END
REAR-END
REAR-END
ANGLE-OTHER
REAR-END

INATT INATT UNSAF-SPD

DYLGT DYLGT

05-17-2012 05-18-2012 06-06-2012 04-30-2012 03-28-2012

DRY DRY DRY

PDO PDO PINJ

08-02-2012 08-30-2012 08-31-2012

FOL-CLOSE INATT

04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08 04.08

04.08 04.08 04.08

04.08 04.08 04.08

REAR-END REAR-END

FOL-CLOSE FOL-CLOSE FOL-CLOSE

N-I INJ 10-06-2011 PDO 10-21-2011 PDO 12-12-2011

PDO 01-16-2012 N-I INJ 03-16-2012

DYLGT DYLGT

F-YIELD

REAR-END REAR-END

UNSAF-SPD DYLGT

DRY

PDO 09-30-2011

PDO 04-29-2011 PDO 05-19-2011

INATT

DYLGT

PDO 09-30-2011 PDO 10-03-2011

FOL-CLOSE

FOL-CLOSE

FOL-CLOSE

DRY

Cond.

DYLGT DYLGT

03-28-2011

REAR-END REAR-END

OTHER

UNSAF-SPD

FOL-CLOSE

DYLGT DYLGT DYLGT DYLGT DARK DYLGT

OTHER

PDO

04-18-2012

DRY DRY DRY DRY DRY DRY DRY DRY DRY DRY

P INJ

04.08 04.08

04.08 04.08 04.08 Mile Post 04.08

### I-35 I-240 INTERCHANGE

City # CS # =





01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

COLLISION LISTING

**Highway System Collision Listing** 

Features

Dir. Veh. lnj. Fat.

Type of Collision

Unsafe

Severity

Date

88888

Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess (405) 522-0985 Traffic Engineering Division Program Provided by:

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### I-35\_I-240 INTERCHANGE





COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 Created: 06/07/2013 by Ken Hess

## Highway System Collision Listing

	DRY DRY	DYLGT	INATT	REAR-END	H	٥	H						04.10	-	0	ŀ
	Н					٥	п	Е	NO				04 48	71	-	55
		DARK	FOL-CLOSE	OTHER	H	မ	т	т	NO				04.18	71	70	55
	DRY	DARK	FOL-CLOSE	REAR-END		2	т	Е	NO				04.18	71	70	55
	DRY	DYLGT	FOL-CLOSE	REAR-END	Ē	2	Е	Е	NO				04.18	71	70	55
	DRY	DARK	UNSAF-SPD	REAR-END	_	4	т	Е	NO				04.18	71	70	55
1	DRY	DARK	D-W-I	F-0 BARR-CONCRETE				Е	NO				04.18	71	70	55
PDO 10-01-2008		DYLGT	FOL-CLOSE	REAR-END	$\vdash$	2	т	т	NO				04.18	71	70	-
N-I INJ 08-01-2008		DARK	FOL-CLOSE	REAR-END	ω	ω	т	т	NO				04.18	71	70	$\vdash$
PDO 07-30-2008	DRY	DYLGT	FOL-CLOSE	REAR-END	$\vdash$	2	т	ш	NO				04.18	71	70	55
PDO 07-16-2008	DRY	DYLGT	FOL-CLOSE	REAR-END	H	2	т	Е	NO				04.18	71	70	Н
PDO 07-15-2008	DRY	DYLGT	IMP-LN-CHG	REAR-END	H	2	т	ш	NO				04.18	71	70	55
PDO 07-01-2008	DRY	DYLGT	FOL-CLOSE	REAR-END		2	т	Е	NO				04.18	71	70	55
PDO 06-18-2008	DRY	DYLGT	FOL-CLOSE	REAR-END		2	E	Е	NO				04.18	71	70	
PDO 05-08-2008	DRY	DYLGT	NO-IMP-ACT	F-0 RET-WALL	H	-		Е	NO				04.18	71	70	55
PDO 05-05-2008	DRY	DYLGT	UNSAF-SPD	F-0 UTIL-POLE		1		E	NO				04.18	71	70	55
N-I INJ 05-02-2008	DRY	DYLGT	FOL-CLOSE	OTHER	3	3	Е	Е	NO				04.18	71	70	55
PDO 04-24-2008	DRY	DYLGT	UNSAF-SPD	REAR-END		2	т	Э.	ON				04.18	71	70	55
P INJ 04-18-2008	DRY	DYLGT	UNSAF-SPD	ROLLOVER		1	7	M	NO				04.18	71	70	
I INJ 03-15-2008	DRY	DYLGT	UNSAF-SPD	REAR-END	2	2	т	Е	NO				04.18	71	70	55
N-I INJ 01-18-2008	DRY	DYLGT	INATT	REAR-END		2	т	Е	NO				04.18	71	70	55
			T	00.06 after SHIELDS EB ENT	00.6	18,	AT: MM 4.18,	AT			HWY: I-240	(70) OKLA, CITY	(70) C	MA	LAHO	(55) OKLAHOMA
PDO 08-30-2010	DRY	DYLGT	FOL-CLOSE	OTHER	Н	3	ш	Е	NO				04.15	71	70	55
PDO 07-13-2010	DRY	DYLGT	FOL-CLOSE	REAR-END		2	Е	Е	NO				04.15	71	70	55
I INJ 04-12-2010	DRY	DYLGT	FOL-CLOSE	REAR-END	Ŧ	2	ш	Е	NO				04.15	71	70	$\dashv$
P INJ 02-13-2009	$\dashv$	DYLGT	UNSAF-SPD	OTHER	_	ω.	т	ш	NO				04.15	71	70	$\dashv$
	$\exists$	DYLGT	UNSAF-SPD	REAR-END		2	ш	ш	NO				04.15	71	$\rightarrow$	-
N-I INJ 06-18-2008	DRY	DYLGT	INATT	REAR-END	3	ω	т	ш	NO				04.15	71	70	55
7			1	00.03 after SHIELDS EB ENT	00.6	15,	AT: MM 4.15,	AT	0	8.	HWY: I-240	(70) OKLA. CITY	(70) C	MA	LAHO	(55) ОКLАНОМА
P INJ 10-05-2011	DRY	DYLGT	FOL-CLOSE	REAR-END		2	ш	Е	NO				04.13	71	70	55
7				00.01 after SHIELDS EB ENT	00.6	13,	AT: MM 4.13	AT			HWY: I-240	(70) OKLA. CITY	(70) C	MA	LAHO	(55) OKLAHOMA
PDO 12-08-2012	DRY	DYLGT	FOL-CLOSE	REAR-END	4	2	ш	Е	NO	M/L RAMP MRG	SHIELDS EB ENT		04.12	71	70	55
PDO 10-02-2012	DRY	DARK	F-YIELD	REAR-END		2	т	Е	NO	M/L RAMP MRG	SHIELDS EB ENT		04.12	71	70	55
PDO 04-06-2012	DRY	DYLGT	IMP-LN-CHG	REAR-END		2	ш	Е	NO	M/L RAMP MRG	SHIELDS EB ENT		04.12	71	70	55
P INJ 04-05-2012	DRY	DYLGT	FOL-CLOSE	REAR-END	_	3	ш	Э.	ON	M/L RAMP MRG	SHIELDS EB ENT		04.12	71	70	55
P INJ 09-22-2011	MET	DYLGT	UNSAF-SPD	F-0 BARR-CONCRETE	j	1	-	¥	NO	M/L RAMP MRG	SHIELDS EB ENT		04.12	71	70	55
	Cond.	Cond.	Unlawful		lnj. Fat.	Veh. Ir	2 V	-	Related				# Post	#		
Roadway Severity Date		Lighting	Unsafe	Type of Collision	#	#	Dir.	Dir.	Int.	Features	Location		t. Mile	CS Int.	<del>1</del>	Cnty City





### I-35\_I-240 INTERCHANGE





COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 Created: 06/07/2013 by Ken Hess

### Highway System Collision Listing

71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	HOMA	71	HOMA	71	71	71	HOMA	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	#	CS
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04.25	04.25	04.25	04.25	04.25	04.25	04.25	04.25	04.25	04.25	04.25	04.25	04.25	04.25	04.25	(70) OKI	04.24	(70) OKI	04.20	04.20	04.20	(70) OKI	04.18	04.18	04.18	04.18	04.18	04.18	04.18	04.18	04.18	04.18	04.18	04.18	04.18	04.18	04.18	04.18	Post	Mile
															(70) OKLA. CITY		(70) OKLA, CITY				(70) OKLA. CITY																		
															HWY: I-240		HWY: 1-240				HWY: I-240		)																Location
																				WKZONE																		1	Features
NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO		NO	NO	NO		NO	NO	NO	NO	NO	NO	NO	NO	Related	Int.								
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FOL-CLOSE	FOL-CLOSE	UNSAF-SPD	UNSAF-SPD	FOL-CLOSE	FOL-CLOSE	IMP-LN-CHG	FOL-CLOSE	UNSAF-SPD	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	INATT		UNSAF-SPD	Г	FOL-CLOSE	OTHER	UNSAF-SPD		D-W-I	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	INATT	IMP-LN-CHG	ITANI	NO-IMP-ACT	IMP-LN-CHG	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	UNSAF-SPD	FOL-CLOSE	Unlawful	Unsafe
DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DARK	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT		DYLGT		DYLGT	DYLGT	DYLGT		DYLGT	DYLGT	DYLGT	DYLGT	DARK	DAWN	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	DYLGT	Cond.	Lighting
DRY	WET	DRY	DRY	WET	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY		WET		DRY	DRY	DRY		DRY	DRY	WET	WET	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	Cond.	Lighting Roadway Severity
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07-28-2011	09-13-2010	08-27-2010	06-08-2010	01-16-2010	12-16-2009	04-04-2009	03-06-2009	02-06-2009	09-26-2008	09-14-2008	06-19-2008	05-13-2008	03-12-2008	01-18-2008		10-22-2010		P INJ 05-29-2011	04-03-2011	10-08-2010		08-29-2012	05-12-2012	02-13-2012	02-03-2012	12-10-2011	10-05-2011	06-17-2011	05-25-2011	04-07-2011	02-12-2011	12-10-2010	12-03-2010	12-03-2010	11-06-2010	08-06-2010	04-02-2010		Date



**ACCESS JUSTIFICATION REPORT** 



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DYLGT DYLGT

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OTHER

OTHER

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IMP-LN-CHG
UNSAF-SPD
IMP-LN-CHG

DYLGT DYLGT

DRY DRY DRY

FOL-CLOSE

DYLGT DYLGT DYLGT

OTHER

DRY

PDO 05-11-2008
PDO 02-25-2008
PDO 03-3-07-2008
PDO 05-07-2008
PDO 05-11-2008
PDO 05-11-2008
PDO 07-14-2008
PDO 07-14-2008
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PDO 08-05-2008
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UNSAF-SPD

DYLGT

## I-35 I-240 INTERCHANGE

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HWY: 1-240

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F-O UTIL-POLE REAR-END

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PDO 06-15-2012

N-I INJ 07-09-2010

N-I INJ 06-20-2010

REAR-END REAR-END OTHER REAR-END

UNSAF-SPD

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08-16-2011

DRY

PDO

04-04-2011

01-17-2008 01-28-2008

AT: MM 4.32,

HWY: 1-240

City

# CS # =

Mile Post 04.25





01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

COLLISION LISTING

**Highway System Collision Listing** 

NO

Dir.

# Fat.

Type of Collision

00.11 before \*20\*

REAR-END

FOL-CLOSE

DUSK DRY DYLGT

PDO 11-07-2012

REAR-END

UNSAF-SPD

DRY Cond.

PINJ

07-25-2012

Unlawful Unsafe

Lighting Cond.

Roadway

Severity

Date

Veh. . ∓ . ∓

> Traffic Engineering Division
> Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess (405) 522-0985

Program Provided by:





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REAR-END
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DYLGT

| DRY | DRY

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N-I INJ 08-28-2009
PDO 09-29-2009
PDO 11-13-2009
PNIJ 11-13-2010
PDO 03-05-2010
PDO 03-12-2010
PDO 03-12-2010
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FOL-CLOSE IMP-LN-CHG

DYLGT

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PDO

12-26-2008 01-20-2009

PDO

01-20-2009

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PDO 12-18-2008

FOL-CLOSE

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# I-35 I-240 INTERCHANGE

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Mile Post 04.35 04.35

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**Highway System Collision Listing** 

Dir.

Type of Collision

Date

Į. Fat. 01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess Program Provided by:

# Page 65/7

PDO 08-19-2010 I INJ 09-30-2010 P INJ 10-03-2010



Page 66/71

# I-35\_I-240 INTERCHANGE



# Highway System Collision Listing

COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 Created: 06/07/2013 by Ken Hess

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OLSSON ®







COLLISION LISTING
01-01-2008 Thru 12-31-2012
1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

Program Provided by: Traffic Engineering Division Collision Analysis and Safety Branch (405) 522-0985 Created: 06/07/2013 by Ken Hess

# Highway System Collision Listing

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BARR-CONCRETE	BARR-CONCRETE	F-0	OTI	REAR-END	F-0 GUARDRL-FACE	HEA	SIDESWIPE-SAME	ANGLE-OTHER	REAF	REAR-END	REAR-END	re CR	REAF	REAF	REAR-END	ANGLE-OTHER	F-0 GUARDRL-END	REAR-END	REAR-END	OTI	REAR-END	OTHER	REAR-END	REAR-END	*20*	REAF	*20*	REAR-END	*20*	REAF	REAF	REAF	F-0 BARR-CONCRETE	OTHER	SIDESWIPE-SAME		Type of Collision
ONCRE	NCRE	ò	OTHER	₹-END	DRL-F	HEAD-ON	PE-SA	-OTHE	REAR-END	~END	€ND	OSSRI	REAR-END	REAR-END	₹-END	-OTHE	WRL-I	₹-END	€ND	OTHER	ÆND.	東	ÆND	-END		REAR-END		-END		REAR-END	REAR-END	REAR-END	ONCRE	東	PE-SA		Collisi
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NO-IMP-ACT		ITANI	FOL-CLOSE	FOL-CLOSE	UNSAF-SPD	UNSAF-SPD	IMP-LN-CHG	NEG-DRVING	IMP-LN-CHG	IMP-LN-CHG	FOL-CLOSE	9	FOL-CLOSE	FOL-CLOSE	IMP-STOP	UNSAF-SPD	UNSAF-SPD	UNSAF-SPD	FOL-CLOSE	NO-IMP-ACT	ITANI	UNSAF-SPD	FOL-CLOSE	FOL-CLOSE		UNSAF-SPD		FOL-CLOSE	7	FOL-CLOSE	FOL-CLOSE	FOL-CLOSE	UNSAF-SPD	UNSAF-SPD	IMP-LN-CHG	Unlawful	Unsafe
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1107-07-71.		10-03-2011	08-09-2011	05-11-2011	02-26-2010	01-29-2010	06-12-2009	03-08	09-22-2008	07-17-2008	01-14-2008		12-09-2011	10-14-2011	08-26-2011	06-23-2011	04-24-2011	04-24-2011	04-05-2011	11-05-2010	05-03-2010	03-28-2009	05-22-2008	04-01-2008		04-07-2012		04-19-2011	1	11-13-2012	10-16-2012	09-13-2012	08-18-2012	07-05-2012	06-28-2012		Date
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(55) OKLAHOMA 55 70 71

04.95

(70) OKLA, CITY

HWY: I-240

TERM LOC LFT YES TERM LOC LFT TERM LOC LFT TERM LOC LFT

E E 2

AT: MM 4.94,

00.01 after CROSSRD/POLUP

FOL-CLOSE

DYLGT

06-25-2011 04-12-2009 01-03-2009 08-20-2008

06-16-2009

REAR-END REAR-END ROLLOVER

UNSAF-SPD

DYLGT

DYLGT

N-I INJ 07-14-2010

P INJ 07-28-2009

N-I INJ 08-14-2010

D-W-I

D-W-I

DARK DARK

RY RY RY DRY DRY

ZNI-N

09-04-2010

PD0

DYLGT

YES YES

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2

REAR-END REAR-END

FOL-CLOSE DYLGT
FOL-CLOSE DYLGT

DRY DRY

PDO PDO

04-22-2010 02-22-2012

06-19-2009

:ROSSRD/POLUP

ANGLE-TURNING

IMP-LN-CHG

OTHER

PDO

IMP-TURN

DARK DARK DARK

F-YIELD

OTHER

DYLGT

DRY DRY DRY

PDO PDO FAT PDO

ANGLE-TURNING

8 8 8

NO

AT: MM 4.87, W W 2 AT: MM 4.91,

00.06 before CROSSRD/POLUP

REAR-END

FO 00.02 before CROSSRD/POLUP

REAR-END

F-O GUARDRI-FACE

FO GUARDRI-FACE

REAR-END

IMP-STOP

DARK DAWN DYLGT

DRY DRY

PDO PDO

09-11-2009

N-I INJ 08-14-2012

N N

W W 2

REAR-END

INATT

DYLGT

DRY

P INJ

07-17-2012

DAWN

DRY

PINJ

12-28-2012

8 8 8

W W 4

REAR-END REAR-END F-0 DITCH

OTHER

UNSAF-SPD FOL-CLOSE

DYLGT

WET ᄝᄝ

CNI I-N

09-29-2012

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RY

PDO

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04.94

04.94 04.94

CROSSRD/POLUP CROSSRD/POLUP

CROSSRD/POLUP

CROSSRD/POLUP

HWY: 1-240

HWY: 1-240

04.94

(70) OKLA. CITY

70 71

04.95 04.95

8 8 8 8 8

F-0 GUARDRL-FACE F-0 GUARDRL-FACE F-O EMBANKMENT NO-IMP-ACT

04.95

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04.85 | (70) OKLA. CITY | 04.87 | (70) OKLA. CITY | 04.88 | (70) OKLA. CITY | 04.92 | (70) OKLA. CITY | 04.92 | (70) OKLA. CITY | 04.93 | (70) OKLA. CITY | (70) OKLA. C

HWY: 1-240

# I-35 I-240 INTERCHANGE

City

# CS # =

Mile Post 04.84 04.84

70 71

04.85 04.85 04.85

HWY: 1-240

04.84 04.84

04.84 04.84

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SIDESWIPE-SAME

IMP-LN-CHG DUSK DRY

10-16-2012 PDO 10-15-2012

FOL-CLOSE DYLGT DRY IMP-LN-CHG DYLGT

REAR-END REAR-END

ROLLOVER

FOL-CLOSE

DARK DRY
DYLGT DRY

P INJ 12-17-2012

PDO

12-10-2012

UNSAF-SPD

D-W-I

DYLGT

PDO

FOL-CLOSE



**Highway System Collision Listing** 

Dir.

Dir. Veh.

Type of Collision

J.

SIDESWIPE-SAME

UNSAF-SPD

DARK Cond.

DRY

N-I INJ 12-21-2011 PDO 03-11-2012 PDO 08-29-2012

DRY

DYLGT

Unlawful

Roadway

Severity

Date

Cond.

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

(405) 522-0985 Traffic Engineering Division
Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess Program Provided by:

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05.04

HWY: 1-240

05.04 05.04

X-MEDIAN

05.05

(70) OKLA. CITY

HWY: 1-240

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[70] OKLA. CITY
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04.98
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05.00
05.00
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070) OKLA. CITY

HWY: 1-240
CROSSRDS WB ENT
CROSSRDS WB ENT
CROSSRDS WB ENT

M/L LOOP MRG
M/L LOOP MRG
M/L LOOP MRG

8 8 8

M M M

REAR-END OTHER

IMP-LN-CHG F-YIELD

DYLGT DYLGT DARK

RY RY

PDO PDO

07-31-2011 04-18-2012

4.99,

F-O GUARDRL-FACE
CROSSRDS WB ENT
REAR-END

DEF-VEH

DYLGT

DRY OTHER

PD0

11-03-2008 12-28-2012

NO NO

AT: MM 4.97,

F-0 TRAFF-SIGN

F-0 TRAFF-SIGN F-0 TRAFF-SIGN F-0 TRAFF-SIGN

UNSAF-SPD UNSAF-SPD UNSAF-SPD

DYLGT

CNI I-N

03-08-2010

DARK DARK

WET WET

PDO PDO

05-01-2009

03-30-2009

DARK

F-0 TRAFF-SIGN

70

X-MEDIAN

m &

F-0 GUARDRL-END after MM 5

HEAD-ON REAR-END REAR-END

×

F-0 BARR-OTHER

IMP-LN-CHG

REAR-END

IMP-LN-CHG

DYLGT DYLGT

DRY DRY

PINJ

07-23-2010

07-28-2009

DARK

PINJ

07-24-2009

DRY

FOL-CLOSE UNSAF-SPD

DEF-VEH

DRY

PDO 04-06-2011 PDO 04-17-2011

PDO 01-07-2011

SIDESWIPE-SAME SIDESWIPE-SAME

IMP-LN-CHG

FOL-CLOSE

DYLGT DYLGT

OTHER

NEG-DRVING IMP-LN-CHG

DARK

DARK DARK DYLGT DYLGT

RRRRRR

PDO 06-09-2011 PDO 01-05-2012 P INJ 02-17-2012

06-09-2011 01-05-2012

# I-35 I-240 INTERCHANGE

City

# CS # =

Mile Post 04.95

70 71

04.96 04.96

04.96

(70) OKLA.

HWY: 1-240

FR BTN RMP/L NO W

00.01 before POLE/CROSS.EB EXIT

F-0 CURB REAR-END

UNSAF-SPD UNSAF-SPD

DARK DRY DYLGT DARK DYLGT

DYLGT

DRY

PDO 08-02-2011
PDO 08-02-2011
PDO 08-02-2011
PDO 03-21-2012
PDO 06-01-2012

F-O GUARDRL-FACE

ITANI

DYLGT

DRY

PDO PDO

10-16-2010

09-01-2011 09-26-2008

DYLGT

DRY

ANGLE-TURNING

IMP-LN-CHG

DARK

INCIDENT

NO NO

WKZONE

8

F-0 GUARDRL-END

OTHER

**NEG-DRVING** 

ROLLOVER

UNSAF-SPD

Cond.

NATT

DRY DRY Features

Dir.

Dir.

Veh. Įnį.

Fat.

Type of Collision

Unsafe

Date

04.97 04.97 04.97 04.97

POLE/CROSS.EB EXIT
POLE/CROSS.EB EXIT
POLE/CROSS.EB EXIT

M/L RAMP MRG M/L LOOP GOR M/L LOOP GOR M/L LOOP GOR

POLE/CROSS.EB EXIT POLE/CROSS.EB EXIT

LOOP

8 8 8 8

HWY: 1-240

FR RD J LEFT

z

N 8 8

04.97

70 71

04.95

04.95 04.95



COLLISION LISTING

Created: 06/07/2013 by Ken Hess (405) 522-0985 Collision Analysis and Safety Branch Traffic Engineering Division Program Provided by:

**Highway System Collision Listing** 

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

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NO NO

W W

REAR-END REAR-END REAR-END REAR-END REAR-END

FOL-CLOSE

DYLGT

DRY WET

PDO

09-19-2009 09-07-2012 03-14-2012

PDO 11-05-2010

e ATSF RR UP





05.52

HWY: 1-240 HWY: 1-240

FR RD J LEFT NO

E W 2 1

AT: MM 5.52, AT: MM 5.51,

00.02 before EASTERN OP 00.03 before EASTERN OP

UNSAF-SPD

DYLGT

DRY

PIN

10-02-2009

L-CENTER

SLEEPY

DARK

DRY DRY

N-I INJ 01-01-2012 PDO 11-23-2017

00.01 before EASTERN OP

징 NO

٤

SIDESWIPE-SAME

FOL-CLOSE

DYLGT

DRY

PIN

06-22-2010 06-21-2010

PDO

FOL-CLOSE

DARK

F-YIELD

DYLGT

DRY DRY

P INJ 06-12-2008

NO

M

(70) OKLA, CITY (70) OKLA. CITY (70) OKLA. CITY

HWY: 1-240

05.53

70 71

05.44 05.44 05.44

**WKZONE** 

88888888

×

OTHER
ANGLE-OTHER
REAR-END

IMP-LN-CHG NEG-DRVING

DARK DYLGT

DRY DRY

rni I-N

03-15-2010 04-18-2008

11-18-2009

08-12-2011 04-07-2011

10-11-2011

PDO

FOL-CLOSE FOL-CLOSE

DYLGT DYLGT DARK

PDO PDO

ROLLOVER REAR-END OTHER OTHER

70 70

(70) OKLA ( 05.34 05.34 05.34 05.34 05.34 05.34 05.34 05.34 05.34 05.34 05.44 05.44 05.44

70

# I-35 I-240 INTERCHANGE

OKLAHOMA

05.24 05.24 05.24

05.33

. CITY

HWY: 1-240

NO

00.01 after EASTRN EB EX.
F-0 DITCH

F-0 BARR-CABLE

DARK

8 8 8 8 8 8

HEAD-ON
OTHER
REAR-END
REAR-END
F-O GUARDRL-END

FOL-CLOSE IMP-LN-CHG FOL-CLOSE

UNSAF-SPD OTHER

DAWN
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT

DRY DRY DRY

PDO
PDO
PDO
PDO
PDO
PDO
PDO
PDO

11-05-2010

11-27-2010 01-19-2011 04-06-2011 10-11-2011 10-11-2011

ROLLOVER ROLLOVER F-0 GUARDRL-END

F-0 FENCE ROLLOVER

INATT

DARK

8 8 8

F-O GUARDRL-END NEG-DRVING
ROLLOVER NO-IMP-ACT

DARK

DYLGT DYLGT

DRY DRY

PDO

09-29-2010

PDO

N-I INJ

07-27-2011

04-22-2011 06-06-2009

SIDESWIPE-SAME

IMP-LN-CHG

DARK

DEF-VEH

DRY

(70) OKLA.

HWY: I-240

05.24 05.14 05.08 05.07 Mile Post

(70) OKLA. CITY (70) OKLA. CITY (70) OKLA. CITY

HWY: 1-240 HWY: 1-240 HWY: 1-240

NO W -

- M ON

00.01 after ATSF RR UP 00.05 before ATSF RR UP

AT: MM 5.23,

00.09 before EASTRN EB EX.

F-O GUARDRL-FACE NO-IMP-ACT DYLGT WET

PDO

07-10-2012

UNSAF-SPD DYLGT DRY

I INJ 05-14-2011

NO W

F-0 GUARDRL-FACE NO-IMP-ACT

DYLGT

DRY Cond.

PINJ

08-23-2008

Unlawful

Lighting Cond.

Roadway

Severity

Date

Unsafe

Dir.

Type of Collision

Dir.

Veh. . ∓ . ∓ Fat.

City

# CS

# =





# **Highway System Collision Listing**

01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY COLLISION LISTING

(405) 522-0985 Collision Analysis and Safety Branch Created: 06/07/2013 by Ken Hess Traffic Engineering Division Program Provided by:

Page 70/7





70 70

05.54

EASTERN EASTERN OP

> TERM LOC LFT TURN LN MRGE

YES

유 유

TERM LOC RIT

YES YES

Z ٤

> ANGLE-TURNING ANGLE-TURNING

RIGHT-ANGLE

F-YIELD OTHER

DYLGT DAWN DYLGT DYLGT

DRY DRY DRY PRY

N-I INJ 07-12-2012 PDO 09-04-2012 PDO 09-04-2012

Location Near But Not At Mile Poil

F-YIELD

05.54 05.54 05.54 70

05.54 05.54 05.54 05.54

유 유 P 유 OP QP. QP QP

> TERM LOC LFT TERM LOC LFT

TERM LOC RIT TERM LOC RIT

ш s × 70

EASTERN EASTERN

EASTERN EASTERN

TERM LOC LFT
TERM LOC RIT
TERM LOC RIT

NAA

ANGLE-TURNING

REAR-END

FOL-CLOSE

DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT

F-YIELD

RIGHT-ANGLE

RIGHT-ANGLE

F-STOP

PDO 01-22-2011 PDO 02-25-2011 N-I INJ 07-22-2011

PDO 09-09-2011

REAR-END

ANGLE-OTHER

RIGHT-ANGLE RIGHT-ANGLE

DYLGT

DRY PRY DRY

PDO 09-20-2011 PDO 01-31-2012 PDO 04-03-2012 PDO 06-22-2012 PDO 06-26-2012

DYLGT

z

REAR-END ANGLE-TURNING

F-YIELD NO-IMP-ACT NO-IMP-ACT

PDO PDO PDO

11-12-2010

TERM LOC LFT

05.54 05.54 05.54 05.54 05.54 05.54 05.54 05.54 05.54 05.54 05.54 05.54

EASTERN OP

TERM LOC RIT
TERM LOC RIT
TERM LOC LFT

S

ANGLE-TURNING ANGLE-TURNING ANGLE-TURNING RIGHT-ANGLE

F-YIELD

DARK
DARK
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT
DYLGT

01-04-2010 02-17-2010 06-23-2010 07-07-2010 07-23-2010 07-23-2010 08-19-2010 09-26-2010 11-10-2010

70

# I-35 I-240 INTERCHANGE

City

Location

Features

Dir.

Type of Collision

Roadway Cond.

Severity

Veh. Įnį. # Fat.

N N

EASTERN OP

REAR-END

DEF-VEH

DARK DARK Cond.

DRY DRY

N-I INJ 09-08-2012

PINJ

09-25-2010 Date

D-W-I Unlawful Unsafe

REAR-END

F-0 GUARDRL-END

RIGHT-ANGLE

PDO 04-24-2008 PDO 05-29-2008

04-15-2008

N-I INJ 10-07-2008

PDO 09-22-2008

N-I INJ 01-06-2009

F-0 CURB

# CS # =

55) OKLAHOMA

(70) OKLA, CITY

HWY: 1-240

EASTERN OP

05.54 05.54

EASTERN EASTERN EASTERN EASTERN EASTERN

TERM LOC RIT

TERM LOC RIT TERM LOC LFT

TERM LOC RIT

YES O

EASTERN

05.54 05.54 05.54

EASTERN EASTERN EASTERN

유 유 유 유 유 유 QP 유

TERM LOC LFT

m & ٤

SIDESWIPE-SAME

IMP-LN-CHG NO-IMP-ACT

DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT DYLGT

DRY DRY DRY DRY DRY DRY DRY DRY

PD0 P INJ

06-30-2009 05-26-2009 04-30-2009 11-03-2008

05-28-2009

F-STOP

RIGHT-ANGLE RIGHT-ANGLE RIGHT-ANGLE

F-0 CURB

TERM LOC RIT TERM LOC LFT TERM LOC RIT

TERM LOC LFT

05.54 05.54

05.54 05.54 05.53 Mile Post 05.53

05.54





01-01-2008 Thru 12-31-2012 I-35 FROM 89 ST. S. TO 66 ST. S, AND I-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

COLLISION LISTING

# **Highway System Collision Listing**

Created: 06/07/2013 by Ken Hess (405) 522-0985 Program Provided by:

Collision Analysis and Safety Branch Traffic Engineering Division



Page 1/1

# I-35\_I-240 INTERCHANGE

Query on County : 55-OKLAHOMA County : 55-OKLAHOMA

Query By
Control Section: 15 -1-35
Control Section: 71 -1-240

Mileage Range 00.00- to 1.48-66 ST. S UP \*21\* 3.88-SHIELDS UP \*86\* to 5.54-EASTERN OP \*88\*

Date range 01-01-2008 to 12-31-2012 01-01-2008 to 12-31-2012





# QUERY CRITERIA RAN 01-01-2008 Thru 12-31-2012 1-35 FROM 89 ST. S. TO 66 ST. S, AND 1-240 FROM SHIELDS TO EASTERN, OKLAHOMA COUNTY

	Create
	Created: 06/07/20

Created: 06/07/2013 by Ken Hess	(405) 522-0985	Collision Analysis and Safety Branch	Traffic Engineering Division	Program Provided by:

Incl. Hwy/Hwy Jct ID Colls	Checked	
Terminal Locations Only	Unchecked	
Within Interchanges		
Intersection Related Only	Unchecked	
Excl. Intersection Related	Unchecked	
CMV Collisions Only	Unchecked	
Incl. Non-Highway Colls	Unchecked	
FILTER DATA BY :		
Severity	All Selected	
Special Feature	All Selected	
Unsafe Unlawful	All Selected	
Type of Collision	All Selected	
Harmful Event for Collision	All Selected	4
Roadway Departure	All Selected	
ROADWAY CRITERIA:		
Average Daily Traffic	All Selected	
National Functional Class	All Selected	
Number of Lanes	All Selected	
Access Control	All Selected	
Median Type	All Selected	
Median Width	All Selected	
Outer Shoulder Type	All Selected	
Outer Shoulder Width	All Selected	
Traffic Control	All Selected	

ENVIROMENT CRITERIA:  Manner of Coll.  Agency Road Conditions All Selected Light Weather All Selected	Unit Type Unit Type Vehicle Type Vehicle Cond Vehicle Cond United Action Direction of Travel_1 Direction of Travel_2 PERSON CRITERIA: Restraint Used Person Conditions Age Sex	All Selected	
ROMENT CRITERIA: er of Coll. cy Conditions her ion Junction	PERSON CRITERIA: Restraint Used Person Conditions	All Selected All Selected	
ROMENT CRITERIA: er of Coll. ey Conditions her ion Junction	Age	All Selected	
rOMENT CRITERIA: ser of Coll. ey Conditions her ion Junction	Sex	All Selected	
or of Coll.  Conditions  Conditions  her  ion Junction	<b>ENVIROMENT CRITERIA:</b>		
cy Conditions her ion Junction	Manner of Coll.	All Selected	
Conditions her ion Junction	Agency	All Selected	
her ion Junction	Road Conditions	All Selected	
her ion Junction	Light	All Selected	
ion Junction	Weather	All Selected	
		All Selected	
	Relation Junction	All Selected	







#### APPENDIX A

### **HCS Basic Freeway Segments**

		Page
A-1	EXISTING CONDITIONS, Utilizing 2013 Traffic Data	113
A-2	EXISTING CONDITIONS, Utilizing 2040 Traffic Data	139
A-3	PROPOSED DESIGN Utilizing 2040 Traffic Data	165





#### HCS 2010: Basic Freeway Segments Release 6.1

Reza Amini, PE Olsson Associates

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E-mail: ramini@olssonassociates.com

\_Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Northbound

From/To: North of Off Ramp to I-35 Northbound C-D Rd.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	4587	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1246	V
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1720	pc/h/ln

#### Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	1720	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.9	mi/h
Number of lanes, N	3	
Density, D	25.7	pc/mi/ln
Level of service, LOS	C	•





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Northbound

From/To: North of Off Ramp to I-35 Northbound C-D Rd.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	3710	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1008	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
TI 4	1201	/1 /1

Flow rate, vp 1391 pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/m
Number of lanes, N	3	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures\_

Flow rate, vp	1391	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.6	mi/h
Number of lanes, N	3	
Density, D	20.0	pc/mi/ln
Level of service, LOS	C	





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:

Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:

Olsson Associates
5/8/2015

AM Peak Hour
I-35 Northbound
South of SE 66<sup>th</sup> St.
Uklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	5840	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1587	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2201	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### \_LOS and Performance Measures\_

Flow rate, vp	2201	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	58.4	mi/h
Number of lanes, N	3	
Density, D	37.7	pc/mi/ln
Level of service, LOS	Е	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/8/2015
PM Peak Hour
I-35 Northbound
From/To:
South of SE 66<sup>th</sup> St.
Uklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	4810	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1307	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	1812	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### \_LOS and Performance Measures\_

Flow rate, vp	1812	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	65.7	mi/h
Number of lanes, N	3	
Density, D	27.6	pc/mi/ln
Level of service LOS	D	





#### HCS 2010: Basic Freeway Segments Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Northbound

From/To: South of SE 59<sup>th</sup> St. and North of Off Ramp to SE 59<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	5640	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1533	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2125	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	2125	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	60.1	mi/h
Number of lanes, N	3	
Density, D	35.4	pc/mi/ln
Level of service LOS	E	





#### HCS 2010: Basic Freeway Segments Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Northbound

From/To: South of SE 59<sup>th</sup> St. and North of Off Ramp to SE 59<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	4620	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1255	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	1741	pc/h/ln

#### Speed Inputs and Adjustments

Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, fLW Lateral clearance adjustment, fLC TRD adjustment	12.0 6.0 2.00 3 Base 75.4 0.0 0.0 5.8	ft ft ramps/mi mi/h mi/h mi/h mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	1741	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.6	mi/h
Number of lanes, N	3	
Density, D	26.1	pc/mi/ln
Level of service LOS	D	





#### HCS 2010: Basic Freeway Segments Release 6.1

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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of SE 59th St. and North of On Ramp from SE 59th St.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	4730	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1285	$\mathbf{v}$
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	1782	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures\_

Flow rate, vp	1782	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.1	mi/h
Number of lanes, N	3	
Density, D	27.0	pc/mi/ln
Level of service, LOS	D	





#### HCS 2010: Basic Freeway Segments Release 6.1

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E-mail: ramini@olssonassociates.com

\_Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of SE 59<sup>th</sup> St. and North of On Ramp from SE 59<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	5870	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1595	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2212	pc/h/ln

#### Speed Inputs and Adjustments\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures\_

Flow rate, vp	2212	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	58.1	mi/h
Number of lanes, N	3	
Density, D	38.1	pc/mi/ln
Level of service, LOS	E	•





#### HCS 2010: Basic Freeway Segments Release 6.1

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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of SE 66<sup>th</sup> St. and North of On Ramp from SE 66<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	4680	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1272	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	1763	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures\_

Flow rate, vp	1763	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.3	mi/h
Number of lanes, N	3	
Density, D	26.6	pc/mi/ln
Level of service, LOS	D	_





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\_Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of SE 66th St. and North of On Ramp from SE 66th St.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	5830	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1584	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2197	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	2197	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	58.5	mi/h
Number of lanes, N	3	
Density, D	37.6	pc/mi/ln
Level of service LOS	E	•





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of I-35 Southbound Off Ramp to I-240 Westbound

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	3780	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1027	V
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1417	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/m
Number of lanes, N	3	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures\_

Flow rate, vp	1417	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	69.5	mi/h
Number of lanes, N	3	
Density, D	20.4	pc/mi/ln
Level of service, LOS	C	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of I-35 Southbound Off Ramp to I-240 Westbound

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	4680	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1272	V
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1755	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	1755	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.4	mi/h
Number of lanes, N	3	
Density, D	26.4	pc/mi/lr
Level of service LOS	D	-





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\_Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: North of I-35 Southbound Off Ramp to SE 89<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	5330	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1448	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	1506	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	1506	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	68.9	mi/h
Number of lanes, N	4	
Density, D	21.9	pc/mi/ln
Level of service LOS	C	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: North of I-35 Southbound Off Ramp to SE 89<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	6550	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1780	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	1851	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	1851	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	65.1	mi/h
Number of lanes, N	4	
Density, D	28.4	pc/mi/ln
Level of service, LOS	D	•





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Operational Analysis

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:

Olsson Associates
5/8/2015
AM Peak Hour
I-240 Eastbound
East of Shields Blvd.
Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	4450	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1209	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
	1.001	0.0

Flow rate, vp 1661 pc/h/ln

#### \_Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures\_

Flow rate, vp	1661	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	67.5	mi/h
Number of lanes, N	3	
Density, D	24.6	pc/mi/ln
Level of service, LOS	C	•





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Operational Analysis

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:

Olsson Associates
5/8/2015
PM Peak Hour
I-240 Eastbound
East of Shields Blvd.
Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	4700	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1277	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1754	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures\_

Flow rate, vp	1754	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.4	mi/h
Number of lanes, N	3	
Density, D	26.4	pc/mi/ln
Level of service, LOS	D	_





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\_Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-240 Eastbound

From/To: Between Pole Rd. & Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	3400	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	924	V
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1912	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures\_

Flow rate, vp	1912	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	64.1	mi/h
Number of lanes, N	2	
Density, D	29.8	pc/mi/ln
Level of service, LOS	D	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-240 Eastbound

From/To: Between Pole Rd. & Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	3400	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	924	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1912	pc/h/ln

#### Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/m
Number of lanes, N	2	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures\_

Flow rate, vp	1912	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	64.1	mi/h
Number of lanes, N	2	
Density, D	29.8	pc/mi/lr
Level of service LOS	D	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/8/2015
AM Peak Hour
I-240 Eastbound
East of Eastern Ave.
Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	3050	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	924	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1707	pc/h/ln

#### Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	1707	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	67.0	mi/h
Number of lanes, N	2	
Density, D	25.5	pc/mi/ln
Level of service, LOS	C	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/8/2015
PM Peak Hour
I-240 Eastbound
East of Eastern Ave.
Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	3050	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	829	$\mathbf{v}$
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1707	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_\_\_

Lane width Right-side lateral clearance Total ramp density, TRD Number of lanes, N	12.0 6.0 2.00 2	ft ft ramps/mi
Free-flow speed: FFS or BFFS Lane width adjustment, fLW	Base 75.4 0.0	mi/h mi/h
Lateral clearance adjustment, fLC TRD adjustment Free-flow speed, FFS	0.0 5.8 69.6	mi/h mi/h mi/h

#### LOS and Performance Measures

Flow rate, vp	1707	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	67.0	mi/h
Number of lanes, N	2	
Density, D	25.5	pc/mi/ln
Level of service, LOS	C	•





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Operational Analysis

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/8/2015
AM Peak Hour
I-240 Westbound
East of Eastern Ave.
Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	2250	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	611	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Elass rata vm	1260	no/lo/lm

Flow rate, vp 1260 pc/h/ln

#### Speed Inputs and Adjustments

12.0	ft
6.0	ft
2.00	ramps/mi
2	-
Base	
75.4	mi/h
0.0	mi/h
0.0	mi/h
5.8	mi/h
69.6	mi/h
	6.0 2.00 2 Base 75.4 0.0 0.0 5.8

#### LOS and Performance Measures\_

Flow rate, vp	1260	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	18.0+	pc/mi/ln
Level of service, LOS	C	-





#### HCS 2010: Basic Freeway Segments Release 6.1

Reza Amini, PE Olsson Associates

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E-mail: <u>ramini@olssonassociates.com</u>

Operational Analysis

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:

Olsson Associates
5/8/2015
PM Peak Hour
I-240 Westbound
East of Eastern Ave.
Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35 I-240 Interchange Traffic Operation

Flow Inputs and Adjustments

Volume, V 2670 veh/h Peak-hour factor, PHF 0.92 Peak 15-min volume, V<sub>15</sub> 726 Trucks and buses % 6 Recreational vehicles 0 % Terrain type: Level Grade % Segment length mi Trucks and buses PCE, ET 1.5 Recreational vehicle PCE, ER 1.2 Heavy vehicle adjustment, fHV 0.971 Driver population factor, fp 1.00

Flow rate, vp 1495 pc/h/ln

Speed Inputs and Adjustments

Lane width 12.0 Right-side lateral clearance 6.0 ft Total ramp density, TRD 2.00 ramps/mi Number of lanes, N Free-flow speed: Base FFS or BFFS 75.4 mi/h Lane width adjustment, fLW 0.0mi/h Lateral clearance adjustment, fLC 0.0 mi/h TRD adjustment 5.8 mi/h Free-flow speed, FFS 69.6 mi/h

LOS and Performance Measures

pc/h/ln Flow rate, vp 1495 Free-flow speed, FFS 69.6 mi/h Average passenger-car speed, S 69.0 mi/h Number of lanes, N 2 Density, D 21.7 pc/mi/ln Level of service, LOS C





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-240 Westbound

From/To: Between Pole Rd. & Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	2650	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	720	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1491	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h
1 /		

#### LOS and Performance Measures\_

Flow rate, vp	1491	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	69.0	mi/h
Number of lanes, N	2	
Density, D	21.6	pc/mi/ln
Level of service, LOS	C	





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\_Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/18/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-240 Westbound

From/To: Between Pole Rd. & Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	3020	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	821	V
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1699	pc/h/ln

#### Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	2	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h
• •		

#### \_LOS and Performance Measures\_

Flow rate, vp	1699	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	67.1	mi/h
Number of lanes, N	2	
Density, D	25.3	pc/mi/ln
Level of service LOS	C	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/8/2015
AM Peak Hour
I-240 Westbound
East of Shields Blvd.
Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	3650	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	821	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1362	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures\_

Flow rate, vp	1362	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	3	
Density, D	19.5	pc/mi/ln
Level of service, LOS	C	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/8/2015
PM Peak Hour
I-240 Westbound
East of Shields Blvd.
Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	4240	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1152	$\mathbf{v}$
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1582	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_\_\_

Lane width Right-side lateral clearance Total ramp density, TRD	12.0 6.0 2.00	ft ft ramps/mi
Number of lanes, N	3	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	1582	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	68.3	mi/h
Number of lanes, N	3	
Density, D	23.2	pc/mi/ln
Level of service, LOS	C	•





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Northbound

From/To: North of Off ramp to I-35 Northbound C-D Rd.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	4401	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1196	V
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	

Flow rate, vp 1650 pc/h/ln

## \_Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	1650	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	67.7	mi/h
Number of lanes, N	3	
Density, D	24.4	pc/mi/ln
Level of service, LOS	C	-





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Operational Analysis

Analyst: RA

Agency or Company:

Date Performed:

Analysis Time Period:

Freeway/Direction:

From/To:

Jurisdiction:

Olsson Associates
5/8/2015

PM Peak Hour

I-35 Northbound

North of SE 82<sup>nd</sup> St.

Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	4598	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1249	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	

Flow rate, vp 1724 pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	1724	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.8	mi/h
Number of lanes, N	3	
Density, D	25.8	pc/mi/ln
Level of service, LOS	C	_





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Northbound

From/To: South of SE 66<sup>th</sup> St. and North of Off Ramp to SE 66<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	6079	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1652	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2291	pc/h/ln

#### Speed Inputs and Adjustments

12.0	ft
6.0	ft
2.00	ramps/mi
3	-
Base	
75.4	mi/h
0.0	mi/h
0.0	mi/h
5.8	mi/h
69.6	mi/h
	6.0 2.00 3 Base 75.4 0.0 0.0 5.8

# LOS and Performance Measures\_

Flow rate, vp	2291	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	56.2	mi/h
Number of lanes, N	3	
Density, D	40.8	pc/mi/ln
Level of service, LOS	E	





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Northbound

From/To: South of SE 66<sup>th</sup> St. and North of Off Ramp to SE 66<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

# Flow Inputs and Adjustments\_

Volume, V	6109	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1660	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2302	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# \_LOS and Performance Measures\_

Flow rate, vp	2302	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	55.9	mi/h
Number of lanes, N	3	
Density, D	41.2	pc/mi/ln
Level of service, LOS	E	•





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Northbound

From/To: South of SE 59<sup>th</sup> St. and North of Off Ramp to SE 59<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	5825	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1583	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2195	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	2195	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	58.5	mi/h
Number of lanes, N	3	
Density, D	37.5	pc/mi/ln
Level of service, LOS	E	_





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Northbound

From/To: South of SE 59<sup>th</sup> St. and North of Off Ramp to SE 59<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	5868	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1595	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2211	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	2211	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	58.1	mi/h
Number of lanes, N	3	
Density, D	38.0	pc/mi/ln
Level of service, LOS	E	-





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of SE 59th St. and North of On Ramp from SE 59th St.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

# Flow Inputs and Adjustments\_

Volume, V	6008	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1633	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2264	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	2264	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	56.9	mi/h
Number of lanes, N	3	
Density, D	39.8	pc/mi/ln
Level of service, LOS	E	-





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of SE 59th St. and North of On Ramp from SE 59th St.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	6116	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1662	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2305	pc/h/ln

# Speed Inputs and Adjustments

i
1

# LOS and Performance Measures\_

Flow rate, vp	2305	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	55.8	mi/h
Number of lanes, N	3	
Density, D	43.1	pc/mi/ln
Level of service, LOS	E	-





## HCS 2010: Basic Freeway Segments Release 6.1

Reza Amini, PE Olsson Associates

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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of SE 66<sup>th</sup> St. and North of On Ramp from SE 66<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	5944	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1615	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2240	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/m
Number of lanes, N	3	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	2240	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	57.5	mi/h
Number of lanes, N	3	
Density, D	39.0	pc/mi/ln
Level of service, LOS	E	-





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of SE 66<sup>th</sup> St. and North of On Ramp from SE 66<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	6065	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1648	$\mathbf{v}$
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2285	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	2285	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	56.3	mi/h
Number of lanes, N	3	
Density, D	40.6	pc/mi/ln
Level of service, LOS	E	_





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of I-35 Southbound Off Ramp to I-240 Westbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

# Flow Inputs and Adjustments\_

Volume, V	4801	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1305	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1800	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	1800	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	65.8	mi/h
Number of lanes, N	3	
Density, D	27.3	pc/mi/ln
Level of service, LOS	D	_





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of I-35 Southbound Off Ramp to I-240 Westbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

# Flow Inputs and Adjustments\_

Volume, V	4604	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1251	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1726	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	1726	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.8	mi/h
Number of lanes, N	3	
Density, D	25.8	pc/mi/ln
Level of service, LOS	C	-





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Operational Analysis

Analyst: RA

Agency or Company: Roadway-Geometric Design

Date Performed: 6/26/2013
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: North of I-35 Southbound Off Ramp to SE 89<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35/I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	6770	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1840	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	1913	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	4	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# \_LOS and Performance Measures\_

Flow rate, vp	1913	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	64.1	mi/h
Number of lanes, N	4	
Density, D	29.8	pc/mi/ln
Level of service, LOS	D	_





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: North of I-35 Southbound Off Ramp to SE 89<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	6979	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1896	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
TI 4	1072	/1 /1

Flow rate, vp 1972 pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# \_LOS and Performance Measures\_

Flow rate, vp	1972	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	63.1	mi/h
Number of lanes, N	4	
Density, D	31.3	pc/mi/ln
Level of service, LOS	D	-





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Operational Analysis

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:

Olsson Associates
5/8/2015
AM Peak Hour
I-240 Eastbound
East of Shields Blvd.
Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

# Flow Inputs and Adjustments\_

Volume, V	5682	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1544	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2120	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# \_LOS and Performance Measures\_

Flow rate, vp	2120	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	60.2	mi/h
Number of lanes, N	3	
Density, D	35.2	pc/mi/ln
Level of service, LOS	E	-





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Operational Analysis

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/8/2015
PM Peak Hour
I-240 Eastbound
East of Shields Blvd.
Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	5969	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1622	$\mathbf{v}$
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2228	pc/h/ln

ite, vp 2220 pc/11/1

#### Speed Inputs and Adjustments

12.0	ft
6.0	ft
2.00	ramps/mi
3	-
Base	
75.4	mi/h
0.0	mi/h
0.0	mi/h
5.8	mi/h
69.6	mi/h
	6.0 2.00 3 Base 75.4 0.0 0.0 5.8

# \_LOS and Performance Measures\_

Flow rate, vp	2228	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	57.7	mi/h
Number of lanes, N	3	
Density, D	38.6	pc/mi/ln
Level of service, LOS	E	





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Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-240 Eastbound

From/To: Between Pole Rd. & Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	4348	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1182	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	2446	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	2	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# \_LOS and Performance Measures\_

Flow rate, vp	2446	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	52.0	mi/h
Number of lanes, N	2	
Density, D	47.0	pc/mi/ln
Level of service LOS	F	•





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Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-240 Eastbound

From/To: Between Pole Rd. & Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	4318	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1173	V
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	2429	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# \_LOS and Performance Measures\_

Flow rate, vp	2429	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	52.5	mi/h
Number of lanes, N	2	
Density, D	46.3	pc/mi/ln
Level of service, LOS	F	





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Operational Analysis

Analyst: RA

Agency or Company:
Date Performed:

Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:

Olsson Associates
5/8/2015

AM Peak Hour
I-240 Eastbound
East of Eastern Ave.
Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Flow Inputs and Adjustments

Volume, V 4348 veh/h Peak-hour factor, PHF 0.92 Peak 15-min volume, V<sub>15</sub> 1182 Trucks and buses 6 % Recreational vehicles 0 % Terrain type: Level Grade Segment length mi Trucks and buses PCE, ET 1.5 Recreational vehicle PCE, ER 1.2

Recreational vehicle PCE, ER 1.2
Heavy vehicle adjustment, fHV 0.971
Driver population factor, fp 1.00

Flow rate, vp 2434 pc/h/ln

\_Speed Inputs and Adjustments

Lane width 12.0 Right-side lateral clearance 6.0 ft Total ramp density, TRD 2.00 ramps/mi Number of lanes, N Free-flow speed: Base FFS or BFFS 75.4 mi/h Lane width adjustment, fLW 0.0 mi/h Lateral clearance adjustment, fLC 0.0 mi/h TRD adjustment 5.8 mi/h Free-flow speed, FFS 69.6 mi/h

LOS and Performance Measures

Flow rate, vp pc/h/ln 2434 Free-flow speed, FFS 69.6 mi/h mi/h Average passenger-car speed, S 52.3 Number of lanes, N 2 46.5 Density, D pc/mi/ln Level of service, LOS F





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Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates Date Performed: 5/8/2015 Analysis Time Period: PM Peak Hour Freeway/Direction: I-240 Eastbound From/To: East of Eastern Ave. Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION] I-35\_I-240 Interchange Traffic Operation Description:

#### Flow Inputs and Adjustments

Volume, V	4494	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1221	V
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2516	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	2516	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	49.9	mi/h
Number of lanes, N	2	
Density, D	50.4	pc/mi/ln
Level of service, LOS	F	





## HCS 2010: Basic Freeway Segments Release 6.1

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Operational Analysis

Analyst: RΑ

Agency or Company: Olsson Associates Date Performed: 6/26/2013 Analysis Time Period: AM Peak Hour I-240 Westbound Freeway/Direction: From/To: East of Eastern Ave. Jurisdiction: Oklahoma County

2040 [EXISTING CONFIGURATION] Analysis Year: Description: I-35\_I-240 Interchange Traffic Operation

Flow Inputs and Adjustments

Volume, V 3304 veh/h Peak-hour factor, PHF 0.92 Peak 15-min volume, V<sub>15</sub> 898 Trucks and buses 6 % Recreational vehicles 0 % Terrain type: Level Grade Segment length mi Trucks and buses PCE, ET 1.5 Recreational vehicle PCE, ER 1.2

Heavy vehicle adjustment, fHV 0.971 1.00 Driver population factor, fp Flow rate, vp 1850

pc/h/ln

Speed Inputs and Adjustments

Lane width 12.0 Right-side lateral clearance 6.0 ft Total ramp density, TRD 2.00 ramps/mi Number of lanes, N Free-flow speed: Base FFS or BFFS 75.4 mi/h Lane width adjustment, fLW 0.0 mi/h Lateral clearance adjustment, fLC 0.0 mi/h TRD adjustment 5.8 mi/h Free-flow speed, FFS 69.6 mi/h

LOS and Performance Measures

Flow rate, vp pc/h/ln 1850 Free-flow speed, FFS 69.6 mi/h mi/h Average passenger-car speed, S 65.1 Number of lanes, N 2 28.4 Density, D pc/mi/ln Level of service, LOS D





## HCS 2010: Basic Freeway Segments Release 6.1

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Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/8/2015
PM Peak Hour
I-240 Westbound
East of Eastern Ave.
Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	4011	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1090	V
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
77	22.45	

Flow rate, vp 2245 pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	2	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# \_LOS and Performance Measures\_

Flow rate, vp	2245	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	57.3	mi/h
Number of lanes, N	2	
Density, D	39.2	pc/mi/ln
Level of service, LOS	E	-





## HCS 2010: Basic Freeway Segments Release 6.1

Reza Amini, PE Olsson Associates

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Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-240 Westbound

From/To: Between Pole Rd. & Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	3367	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	915	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1894	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	2	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	1894	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	64.4	mi/h
Number of lanes, N	2	
Density, D	29.4	pc/mi/ln
Level of service, LOS	D	





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Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/8/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-240 Westbound

From/To: Between Pole Rd. & Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	3834	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1042	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	2157	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	2157	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	59.4	mi/h
Number of lanes, N	2	
Density, D	36.3	pc/mi/ln
Level of service, LOS	E	-





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Operational Analysis

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/8/2015
AM Peak Hour
I-240 Westbound
East of Shields Blvd.
Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments\_

Volume, V	4636	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1260	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1730	pc/h/ln

## Speed Inputs and Adjustments\_\_

12.0	ft
6.0	ft
2.00	ramps/mi
3	-
Base	
75.4	mi/h
0.0	mi/h
0.0	mi/h
5.8	mi/h
69.6	mi/h
	6.0 2.00 3 Base 75.4 0.0 0.0 5.8

# LOS and Performance Measures\_

Flow rate, vp	1730	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.7	mi/h
Number of lanes, N	3	
Density, D	25.9	pc/mi/ln
Level of service, LOS	C	-





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Operational Analysis

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/8/2015
PM Peak Hour
I-240 Westbound
East of Shields Blvd.
Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	5384	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1463	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
TI .	2000	/1 /1

Flow rate, vp 2009 pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	2009	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	62.4	mi/h
Number of lanes, N	3	
Density, D	32.2	pc/mi/ln
Level of service, LOS	D	_





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Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/12/2015
AM Peak Hour
I-35 Northbound
From/To:
South of SE 89<sup>th</sup> St.
Uklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	6395	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1738	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	2398	pc/h/ln

#### Speed Inputs and Adjustments

12.0	ft
6.0	ft
2.00	ramps/mi
3	-
Base	
75.4	mi/h
0.0	mi/h
0.0	mi/h
5.8	mi/h
69.6	mi/h
	6.0 2.00 3 Base 75.4 0.0 0.0 5.8

# LOS and Performance Measures\_

Flow rate, vp	2398	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	53.4	mi/h
Number of lanes, N	3	
Density, D	44.9	pc/mi/ln
Level of service, LOS	E	





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/12/2015
PM Peak Hour
I-35 Northbound
South of SE 89<sup>th</sup> St.
Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	6335	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1721	V
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	2376	pc/h/ln

## Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	2376	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	54.0	mi/h
Number of lanes, N	3	
Density, D	44.0	pc/mi/ln
Level of service LOS	E	-





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\_Operational Analysis\_

Analyst: RA

Agency or Company:

Date Performed:

Analysis Time Period:

Freeway/Direction:

From/To:

Jurisdiction:

Olsson Associates

5/12/2015

AM Peak Hour

I-35 Northbound

North of SE 89<sup>th</sup> St.

Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	7221	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1962	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2041	pc/h/ln

## Speed Inputs and Adjustments\_\_\_\_\_

Lane width Right-side lateral clearance Total ramp density, TRD Number of lanes, N Free-flow speed:	12.0 6.0 2.00 4 Base	ft ft ramps/mi
FFS or BFFS Lane width adjustment, fLW Lateral clearance adjustment, fLC TRD adjustment Free-flow speed, FFS	75.4 0.0 0.0 5.8 69.6	mi/h mi/h mi/h mi/h mi/h

### LOS and Performance Measures

Flow rate, vp	2041	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	61.8	mi/h
Number of lanes, N	4	
Density, D	33.0	pc/mi/ln
Level of service, LOS	D	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/12/2015
PM Peak Hour
I-35 Northbound
North of SE 89<sup>th</sup> St.
Uklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	7161	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1946	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2024	pc/h/ln

## Speed Inputs and Adjustments\_\_\_\_

Lane width Right-side lateral clearance Total ramp density, TRD Number of lanes, N Free-flow speed:	12.0 6.0 2.00 4 Base	ft ft ramps/mi
FFS or BFFS Lane width adjustment, fLW Lateral clearance adjustment, fLC TRD adjustment Free-flow speed, FFS	75.4 0.0 0.0 5.8 69.6	mi/h mi/h mi/h mi/h mi/h

# LOS and Performance Measures\_

Flow rate, vp	2024	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	62.1	mi/h
Number of lanes, N	4	
Density, D	32.6	pc/mi/ln
Level of service LOS	D	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:

Date Performed:

Analysis Time Period:

Freeway/Direction:

From/To:

Jurisdiction:

Olsson Associates

5/12/2015

AM Peak Hour

I-35 Northbound

South of SE 59<sup>th</sup> St.

Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	5764	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1566	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2172	pc/h/ln

## Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# \_LOS and Performance Measures\_

Flow rate, vp	2172	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	59.0	mi/h
Number of lanes, N	3	
Density, D	36.8	pc/mi/lr
Level of service LOS	E	-





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/12/2015
PM Peak Hour
I-35 Northbound
From/To:
South of SE 59<sup>th</sup> St.
Uklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	5676	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1542	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2139	pc/h/ln

## Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# \_LOS and Performance Measures\_

Flow rate, vp	2139	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	59.8	mi/h
Number of lanes, N	3	
Density, D	35.8	pc/mi/ln
Level of service LOS	E	





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/12/2015
AM Peak Hour
I-35 Southbound
South of SE 59<sup>th</sup> St.
Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	6046	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1643	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2278	pc/h/ln

## Speed Inputs and Adjustments\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# LOS and Performance Measures\_

Flow rate, vp	2278	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	56.5	mi/h
Number of lanes, N	3	
Density, D	40.3	pc/mi/ln
Level of service LOS	E	-





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/12/2015
PM Peak Hour
I-35 Southbound
South of SE 59<sup>th</sup> St.
Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments

Volume, V	6233	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1694	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2349	pc/h/ln

## Speed Inputs and Adjustments\_

Lane width Right-side lateral clearance Total ramp density, TRD Number of lanes, N	12.0 6.0 2.00 3	ft ft ramps/mi
Free-flow speed: FFS or BFFS	Base 75.4	mi/h
Lane width adjustment, fLW Lateral clearance adjustment, fLC	0.0	mi/h mi/h
TRD adjustment Free-flow speed, FFS	5.8 69.6	mi/h mi/h

# \_LOS and Performance Measures\_

Flow rate, vp	2349	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	54.7	mi/h
Number of lanes, N	3	
Density, D	43.0	pc/mi/ln
Level of service LOS	E	_





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Operational Analysis

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/12/2015
Analysis Time Period: AM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of Off Ramp to SE 66<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments\_

Volume, V	6290	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1709	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	1778	pc/h/ln

ow rate, vp 1778 pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	4	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# \_LOS and Performance Measures\_

Flow rate, vp	1778	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.1	mi/h
Number of lanes, N	4	
Density, D	26.9	pc/mi/ln
Level of service, LOS	D	





# HCS 2010: Basic Freeway Segments Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency or Company: Olsson Associates
Date Performed: 5/12/2015
Analysis Time Period: PM Peak Hour
Freeway/Direction: I-35 Southbound

From/To: South of Off Ramp to SE 66<sup>th</sup> St.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

## Flow Inputs and Adjustments\_

Volume, V	6632	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1802	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	1874	pc/h/ln

## Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

# \_LOS and Performance Measures\_

Flow rate, vp	1874	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	4	
Density, D	29.0	pc/mi/ln
Level of service LOS	D	-





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/12/2015
AM Peak Hour
I-35 Southbound
North of SE 89<sup>th</sup> St.
Uklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	6935	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1885	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	1960	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	4	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

## \_LOS and Performance Measures\_

Flow rate, vp	1960	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	63.3	mi/h
Number of lanes, N	4	
Density, D	31.0	pc/mi/ln
Level of service, LOS	D	-





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/12/2015
PM Peak Hour
I-35 Southbound
North of SE 89<sup>th</sup> St.
Uklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	7220	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1962	V
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	2040	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	4	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	2040	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	61.8	mi/h
Number of lanes, N	4	
Density, D	33.0	pc/mi/ln
Level of service, LOS	D	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:

Date Performed:

Analysis Time Period:

Freeway/Direction:

From/To:

Jurisdiction:

Olsson Associates

5/12/2015

AM Peak Hour

I-35 Southbound

South of SE 89<sup>th</sup> St.

Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	6325	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1719	V
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	2372	pc/h/ln

#### Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

## LOS and Performance Measures\_

Flow rate, vp	2372	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	54.1	mi/h
Number of lanes, N	3	
Density, D	43.9	pc/mi/ln
Level of service LOS	E	-





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/12/2015
PM Peak Hour
I-35 Southbound
South of SE 89<sup>th</sup> St.
Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	6395	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1738	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	2398	pc/h/ln

#### Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	2398	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	53.4	mi/h
Number of lanes, N	3	
Density, D	44.9	pc/mi/ln
Level of service, LOS	E	-





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/12/2015
AM Peak Hour
I-240 Eastbound
West of Shields Blvd.
Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	6097	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1657	V
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1706	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	1706	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	67.0	mi/h
Number of lanes, N	4	
Density, D	25.5	pc/mi/ln
Level of service, LOS	C	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:
Olsson Associates
5/12/2015
PM Peak Hour
I-240 Eastbound
West of Shields Blvd.
Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	6539	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1777	V
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1830	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h
-		

## LOS and Performance Measures\_

Flow rate, vp	1830	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	65.4	mi/h
Number of lanes, N	4	
Density, D	28.0	pc/mi/ln
Level of service LOS	D	-





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:

Olsson Associates
5/12/2015
AM Peak Hour
I-240 Eastbound
From/To:
East of Pole Road
Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	4478	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1217	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1259	pc/h/ln

#### Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	4	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

## \_LOS and Performance Measures\_

Flow rate, vp	1259	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	18.0	pc/mi/ln
Level of service, LOS	В	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:

Olsson Associates
5/12/2015
PM Peak Hour
I-240 Eastbound
From/To:
East of Pole Road
Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	4626	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1257	V
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1301	pc/h/ln

## Speed Inputs and Adjustments

Lane width Right-side lateral clearance	12.0 6.0	ft ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	4	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	1301	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	69.9	mi/h
Number of lanes, N	4	
Density, D	18.6	pc/mi/ln
Level of service, LOS	C	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:

Olsson Associates
5/12/2015
AM Peak Hour
I-240 Westbound
From/To:
East of Pole Road
Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	3465	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	942	V
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1299	pc/h/ln

#### Speed Inputs and Adjustments\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/m
Number of lanes, N	3	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	1299	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	69.9	mi/h
Number of lanes, N	3	
Density, D	18.6	pc/mi/ln
Level of service, LOS	C	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:

Olsson Associates
5/12/2015
PM Peak Hour
I-240 Westbound
From/To:
East of Pole Road
Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	4081	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1109	V
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1530	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	•
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

#### LOS and Performance Measures

Flow rate, vp	1530	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	68.7	mi/h
Number of lanes, N	3	
Density, D	22.3	pc/mi/ln
Level of service, LOS	C	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:

Olsson Associates
5/12/2015
AM Peak Hour
I-240 Westbound
East of Shields Blvd.
Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments

Volume, V	4880	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1326	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1366	pc/h/ln

#### Speed Inputs and Adjustments\_\_\_\_

Lane width Right-side lateral clearance Total ramp density, TRD Number of lanes, N Free-flow speed:	12.0 6.0 2.00 4 Base	ft ft ramps/mi
FFS or BFFS Lane width adjustment, fLW Lateral clearance adjustment, fLC TRD adjustment Free-flow speed, FFS	75.4 0.0 0.0 5.8 69.6	mi/h mi/h mi/h mi/h mi/h

#### LOS and Performance Measures

Flow rate, vp	1366	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	4	
Density, D	19.6	pc/mi/ln
Level of service LOS	C	•





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\_Operational Analysis\_

Analyst: RA

Agency or Company:
Date Performed:
Analysis Time Period:
Freeway/Direction:
From/To:
Jurisdiction:

Olsson Associates
5/12/2015
PM Peak Hour
I-240 Westbound
East of Shields Blvd.
Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

#### Flow Inputs and Adjustments\_

Volume, V	5734	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, V <sub>15</sub>	1558	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1605	pc/h/ln

#### \_Speed Inputs and Adjustments\_\_\_\_\_

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	4	_
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

## \_LOS and Performance Measures\_

Flow rate, vp	1605	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	68.1	mi/h
Number of lanes, N	4	
Density, D	23.6	pc/mi/ln
Level of service LOS	C	•







## APPENDIX B

## **HCS Basic Freeway Merge and Diverge Segments**

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B-3	PROPOSED DESIGN, Utilizing 2040 Traffic Data	235





#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_\_\_\_Diverge Analysis\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/8/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: Off Ramp to I-35 Northbound C-D Rd.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

\_Freeway Data\_\_

Type of analysis Diverge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 6590 vph

Off Ramp Data

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp2003vphLength of first accel/decel lane1500ft

\_Adjacent Ramp Data (if one exists)\_

No

Does adjacent ramp exist?

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Distance to adjacent ramp ft

\_\_\_\_\_Conversion to pc/h Under Base Conditions\_

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	6590	2003	0	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1791	544		v
Trucks and buses	8	10	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level		
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.952	1.000	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7450	2286	0	peph





Estimation of V12 Diverge Areas

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.469

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 4706$ 

Capacity Checks

 $V_{FI}\!=V_F$ 

Actual 7450

Maximum 7187

LOS F? Yes

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

5164

7187

2100

 $V_{R}$ 

2286

No Yes

 $V_3$  or  $V_{av34}$ 

2744 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

Yes

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

If yes,  $V_{12A}$ =

4750

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Actual 4750

Max Desirable 4400

Violation?

Level of Service Determination (if not F)\_

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 \ V_{12} \text{ - } 0.009 \ L_D \ = \ 31.6 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: F

Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.504$ 

Space mean speed in ramp influence area,  $S_R = 55.7$  mph

Space mean speed in outer lanes,

 $S_0 = 69.7$  mph

Space mean speed for all vehicles,

S = 60.1mph





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\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/8/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: Off Ramp to I-35 Northbound C-D Rd.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35 I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6

Free-flow speed on freeway 69.6 mph Volume on freeway 5430 vph

\_Off Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp1720vphLength of first accel/decel lane1500ft

Adjacent Ramp Data (if one exists)\_\_\_\_

Does adjacent ramp exist?

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Distance to adjacent ramp ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	5430	1720	0	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1476	467		v
Trucks and buses	8	10	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level		
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.952	1.000	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6138	1963	0	pcph





Estimation of V12 Diverge Areas

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.516

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 4118$ 

Capacity Checks

 $V_{FI}\!=V_F$ 

Actual 6138

Maximum 7187

LOS F?

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

4175

1963

7187

 $V_{R}$ 

2100

No No

 $V_3$  or  $V_{av34}$ 

2020 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

If yes,  $V_{12A}$ =

4118

(Equation 13-15, 13-16, 13-18, or 13-19)

OLSSON ®

Flow Entering Diverge Influence Area

Actual

Max Desirable

Violation? No

4118 4400 Level of Service Determination (if not F)\_

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 \ V_{12} \text{ - } 0.009 \ L_D \ = \ 26.2 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: C

Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.475$ 

Space mean speed in ramp influence area,  $S_R = 56.5$  mph

Space mean speed in outer lanes,

 $S_0 = 72.4$  mph

mph

Space mean speed for all vehicles,

S = 60.9





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Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/8/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: Off Ramp to SE 59<sup>th</sup> Street Jurisdiction: Oklahoma County

Jurisdiction: Oklahoma County
Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

\_Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 5840 vph

\_Off Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp200vphLength of first accel/decel lane0ft

\_\_\_\_\_Adjacent Ramp Data (if one exists)\_\_\_\_\_

Does adjacent ramp exist? No

Volume on adjacent ramp vph

Position of adjacent ramp
Type of adjacent ramp
Distance to adjacent ramp

Distance to adjacent ramp ft

\_\_Conversion to pc/h Under Base Conditions\_

Junction Components	Freeway	Ramp	Adjacent I	Ramp
Volume, V (vph)	5840	200	0	vph
Peak-hour factor, PHF	0.92	0.92	0.92	•
Peak 15-min volume, V <sub>15</sub>	1587	54		v
Trucks and buses	8	5	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level		
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.976	1.000	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6602	223	0	pcph





Estimation of V12 Diverge Areas

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.585

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3953$ 

Capacity Checks

 $V_{FI}\!=V_F$ 

Actual 6602

Maximum 7187

LOS F?

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

6379

7187

 $V_{R}$ 

223

No No

 $V_3$  or  $V_{av34}$ 

2100

2649 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

2700 pc/h?

No

If yes,  $V_{12A}$ =

3953

(Equation 13-15, 13-16, 13-18, or 13-19)

Violation?

No

Actual

Flow Entering Diverge Influence Area Max Desirable

3953 4400

 $V_{12}$ 

Level of Service Determination (if not F)\_

Density,

 $D_R = 4.252 + 0.0086 \ V_{12} \text{ - } 0.009 \ L_D \ = \ 38.2 \quad pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: E

Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.318$ 

Space mean speed in ramp influence area,  $S_R = 60.8$  mph

Space mean speed in outer lanes,

 $S_0 = 69.9$  mph

mph

Space mean speed for all vehicles,

S = 64.2





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Diverge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/8/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: Off Ramp to SE 59<sup>th</sup> Street

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 4810 vph

\_\_Off Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp190vphLength of first accel/decel lane0ft

\_Adjacent Ramp Data (if one exists)\_

Does adjacent ramp exist?

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Distance to adjacent ramp ft

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 4810 190 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1307 52 Trucks and buses 5 0 % 8 0 Recreational vehicles 0 Terrain type: Level Level 0.00%Grade 0.00%0.00% 0.00 mi 0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.962 0.976 1.000 Driver population factor, fP 1.00 1.00 1.00 Flow rate, vp 5437 212 0 pcph





Estimation of V12 Diverge Areas

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.614

Using Equation 5

LOS F?

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3422$ 

Capacity Checks

 $V_{FI}\!=V_F$ 

Actual 5437

Maximum

7187 7187

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

5225

No No

 $V_{R}$ 

212

2100

 $V_3$  or  $V_{av34}$ 

2015 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

If yes,  $V_{12A}$ =

3422

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Actual 3422 4400

Max Desirable

Violation? No

Level of Service Determination (if not F)\_

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 \ V_{12} \text{ - } 0.009 \ L_D \ = \ 33.7 \quad pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: D

Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.317$ 

Space mean speed in ramp influence area,  $S_R = 60.8$  mph

Space mean speed in outer lanes,

 $S_0 = 72.4$  mph

Space mean speed for all vehicles,

S = 64.7mph





#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Diverge Analysis

Analyst: RA

Agency/Co.: Olsson Associates 5/8/2015 Date performed: Analysis time period: AM Peak Hour I-240 Eastbound Freeway/Dir of Travel:

Junction: Off Ramp to Shields Blvd. Oklahoma County Jurisdiction:

Analysis Year: 2013 [EXISTING CONFIGURATION]

I-35\_I-240 Interchange Traffic Operational Analysis Description:

Freeway Data\_

Type of analysis Diverge Number of lanes in freeway

Free-flow speed on freeway 69.6 mph Volume on freeway 5050 vph

Off Ramp Data

Side of freeway Right Number of lanes in ramp

Free-Flow speed on ramp 35.0 mph Volume on ramp 600 vph Length of first accel/decel lane 350 ft Length of second accel/decel lane ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes

Volume on adjacent ramp 550 vph Position of adjacent ramp Upstream Type of adjacent ramp Off Distance to adjacent ramp 1600

Conversion to pc/h Under Base Conditions

Junction Components Adjacent Ramp Freeway Ramp Volume, V (vph) 5050 600 550 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, v15 1372 163 149 Trucks and buses 5 5 % 0 Recreational vehicles 0 0 Terrain type: Level Level Level 0.00 % 0.00 % 0.00 Grade Length 0.00 mi 0.00 mi 0.00 1.5 Trucks and buses PCE, ET 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 0.976 0.976 Heavy vehicle adjustment, fHV 0.966 Driver population factor, fP 1.00 1.00 1.00 5681 668 Flow rate, vp 613



pcph



Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

1.000

Using Equation 5

LOS F?

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3612$ 

pc/h

Capacity Checks

 $V_{FI} = V_F$ 

Actual 3681

Maximum 7187

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

5013

7187

No No

No

 $V_{\text{R}}$ 

668

2100

V<sub>3</sub> or V<sub>av34</sub>

2069

pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A} =$ 

3612

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Actual

Max Desirable

Violation? No

3612 4400 Level of Service Determination (if not F)

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 32.2 \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: D

\_Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.488$ 

Space mean speed in ramp influence area,  $S_R = 56.1$  mph

Space mean speed in outer lanes,

 $S_0 = 72.2$  mph

Space mean speed for all vehicles,

S = 61.1mph





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Diverge Analysis

Analyst:

Agency/Co.: Olsson Associates Date performed: 5/8/2015 PM Peak Hour Analysis time period: Freeway/Dir of Travel: I-240 Eastbound

Junction: Off Ramp to Shields Blvd. Oklahoma County Jurisdiction:

2013 [EXISTING CONFIGURATION] Analysis Year:

I-35\_I-240 Interchange Traffic Operational Analysis Description:

Freeway Data

Type of analysis Diverge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 5430 vph

Off Ramp Data\_

Right Side of freeway Number of lanes in ramp

Free-Flow speed on ramp 35.0 mph Volume on ramp 730 vph Length of first accel/decel lane ft 350 Length of second accel/decel lane ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes

Volume on adjacent ramp 650 vph Position of adjacent ramp Upstream Type of adjacent ramp Off Distance to adjacent ramp 1600

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 5430 730 650 vph 0.92 Peak-hour factor, PHF 0.92 0.92 Peak 15-min volume, v15 1508 203 181 Trucks and buses 5 % 0 0 0 Recreational vehicles % Terrain type: Level Level Level Grade 0.00 % 0.00 % 0.00 % Length 0.00 mi 0.00 mi 0.00 Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.966 0.976 0.976 Driver population factor, fP 1.00 1.00 1.00 Flow rate, vp 6109 813 724 pcph





Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.570

Using Equation 5

LOS F?

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3831$ 

pc/h

No

No

Capacity Checks

 $V_{FI} = V_F$ 

Actual 6109

Maximum 7187

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

5296

7187

2100

V<sub>3</sub> or V<sub>av34</sub>

 $V_{\text{R}}$ 

813 2278

No pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A} =$ 

3831

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Actual 3831

Max Desirable 4400

Violation?

Level of Service Determination (if not F)

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 \ V_{12} - 0.009 \ L_D = 34.0 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: D

\_Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.501$ 

Space mean speed in ramp influence area,  $S_R = 55.8$  mph

Space mean speed in outer lanes,

 $S_0 = 71.4$  mph

Space mean speed for all vehicles,

mph

S = 60.7





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Diverge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/8/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Junction: Off Ramp to Eastern Ave. Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35 I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge Number of lanes in freeway 2

Free-flow speed on freeway 69.6 mph Volume on freeway 3400 vph

\_\_Off Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp350vphLength of first accel/decel lane230ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Distance to adjacent ramp ft

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 3400 350 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 924 95 Trucks and buses 5 0 % 7 0 0 Recreational vehicles Terrain type: Level Level 0.00%Grade 0.00%0.00%0.00 mi 0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.966 0.976 1.000 Driver population factor, fP 1.00 1.00 1.00 Flow rate, vp 3825 390 0 pcph





\_Estimation of V12 Diverge Areas\_\_\_\_

 $L_{EQ} =$  (Equation 13-12 or 13-13)

 $P_{FD} = 1.000$  Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3825$  pc/h

\_Capacity Checks

Actual Maximum LOS F?

 $V_{FI} = V_{F}$  3825 4791 No

 $V_{FO} = V_F - V_R$  3435 4791 No

V<sub>R</sub> 390 2100 No

 $V_3 \ or \ V_{av34} \qquad \qquad 0 \qquad pc/h \quad \text{(Equation 13-14 or 13-17)}$ 

Is  $V_3$  or  $V_{av34} > 2700 \text{ pc/h}$ ? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$  No

If yes,  $V_{12A}$  = 3825 (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_Flow Entering Diverge Influence Area\_\_\_\_\_

Actual Max Desirable Violation?

 $V_{12}$  3825 4400 No

Level of Service Determination (if not F)

Density,  $D_{R} = 4.252 + 0.0086 \; V_{12} \text{ - } 0.009 \; L_{D} \; = \; 35.1 \quad pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: E

Speed Estimation

Intermediate speed variable,  $D_S = 0.333$ 

Space mean speed in ramp influence area,  $S_R = 60.4$  mph

Space mean speed in outer lanes,  $S_0 = N/A$  mph

Space mean speed for all vehicles, S = 60.4 mph





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\_\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/8/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound
Junction: Off Ramp to Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge Number of lanes in freeway 2

Free-flow speed on freeway 69.6 mph Volume on freeway 3400 vph

\_\_Off Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp350vphLength of first accel/decel lane230ft

\_Adjacent Ramp Data (if one exists)\_\_

Does adjacent ramp exist?

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Distance to adjacent ramp ft

\_Conversion to pc/h Under Base Conditions\_

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	3400	350	0	vph
Peak-hour factor, PHF	0.92	0.92	0.92	_
Peak 15-min volume, V <sub>15</sub>	924	95		v
Trucks and buses	7	5	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level		
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.976	1.000	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3825	390	0	peph





Estimation of V12 Diverge Areas

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

1.000

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3825$ 

Capacity Checks

 $V_{FI}\!=V_F$ 

Actual 3825

Maximum 4791

LOS F?

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

2647

4791

 $V_{R}$ 

2100 390

No

No

 $V_3$  or  $V_{av34}$ 

0 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

If yes,  $V_{12A}$ =

3825

(Equation 13-15, 13-16, 13-18, or 13-19)

3825

Flow Entering Diverge Influence Area Actual

Max Desirable 4400

Violation? No

Level of Service Determination (if not F)\_

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 \ V_{12} \text{ - } 0.009 \ L_D \ = \ 35.1 \quad pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: E

Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.333$ 

Space mean speed in ramp influence area,  $S_R = 60.4$  mph

Space mean speed in outer lanes,

 $S_0 = N/A$  mph

Space mean speed for all vehicles,

S = 60.4mph





## HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Merge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/8/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: On Ramp from Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Analysis

Freeway Data

Type of analysis Merge Number of lanes in freeway 2

Free-flow speed on freeway 69.6 mph Volume on freeway 2250 vph

On Ramp Data\_\_\_\_\_

Side of freewayRightNumber of lanes in ramp1Free-flow speed on ramp45.0mphVolume on ramp400vphLength of first accel/decel lane500ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent Ramp vph

Position of adjacent Ramp Type of adjacent Ramp

Distance to adjacent Ramp ft

Conversion to pc/h Under Base Conditions\_\_\_\_\_

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 400 2250 vph Peak-hour factor, PHF 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 611 109 Trucks and buses % 5 0 Recreational vehicles 0 Terrain type: Level Level Grade % Length mi mi mi Trucks and buses PCE, ET 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 Heavy vehicle adjustment, fHV 0.966 0.976 1.00 Driver population factor, fP 1.00 Flow rate, vp 2531 446 pcph





Estimation of V<sub>12</sub> Merge Areas\_\_\_\_\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 1.000$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 2531 \text{ pc/h}$ 

\_\_\_Capacity Checks\_

Actual Maximum LOS F?

V<sub>FO</sub> 2977 4791 No

 $V_3$  or  $V_{av34}$  0 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700 \text{ pc/h}$ ? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? No

If yes,  $V_{12A} = 2531$  (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_\_Flow Entering Merge Influence Area\_\_\_\_\_

Actual Max Desirable Violation?

 $V_{R12}$  2977 4600 No

Level of Service Determination (if not F)

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} - 0.00627 \ L_A = 25.4 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence C

\_Speed Estimation\_

Intermediate speed variable,  $M_S = 0.353$ 

Space mean speed in ramp influence area,  $S_R = 59.9$  mph

Space mean speed in outer lanes,  $S_0 = N/A$  mph

Space mean speed for all vehicles, S = 59.9 mph



## HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Merge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/8/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: On Ramp from Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Analysis

Freeway Data\_\_\_\_

Type of analysis Merge Number of lanes in freeway 2

Free-flow speed on freeway 69.6 mph Volume on freeway 2670 vph

\_\_\_\_On Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-flow speed on ramp45.0mphVolume on ramp350vphLength of first accel/decel lane500ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent Ramp vph

Position of adjacent Ramp Type of adjacent Ramp

Distance to adjacent Ramp ft

Conversion to pc/h Under Base Conditions\_

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	2670	350		vph
Peak-hour factor, PHF	0.92	0.92		-
Peak 15-min volume, V <sub>15</sub>	726	95		v
Trucks and buses	7	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.966	0.976		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3004	390		pcph





Estimation of V<sub>12</sub> Merge Areas\_\_\_\_\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 1.000$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 3004 \text{ pc/h}$ 

\_\_\_Capacity Checks\_

Actual Maximum LOS F?

V<sub>FO</sub> 3394 4791 No

 $V_3$  or  $V_{av34}$  0 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700 \text{ pc/h}$ ? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? No

If yes,  $V_{12A} = 3004$  (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_\_Flow Entering Merge Influence Area\_\_\_\_\_

Actual Max Desirable Violation?

V<sub>R12</sub> 3394 4600 No

Level of Service Determination (if not F)

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} - 0.00627 \ L_A = 28.8 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence D

\_Speed Estimation\_

Intermediate speed variable,  $M_S = 0.392$ 

Space mean speed in ramp influence area,  $S_R = 58.8$  mph

Space mean speed in outer lanes,  $S_0 = N/A$  mph

Space mean speed for all vehicles, S = 58.8 mph



#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_Merge Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/8/2015
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-240 Westbound

Junction: On Ramp from Shields Blvd.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]

Description: I-35\_I-240 Interchange Traffic Operational Analysis

\_Freeway Data\_

Type of analysis Merge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 3650 vph

On Ramp Data

Side of freeway Right
Number of lanes in ramp 1
Free-flow speed on ramp 35.0 mph
Volume on ramp 710 vph
Length of first accel/decel lane 600 ft
Length of second accel/decel lane ft

\_Adjacent Ramp Data (if one exists)\_

Does adjacent ramp exist?YesVolume on adjacent Ramp600 vphPosition of adjacent RampDownstreamType of adjacent RampOnDistance to adjacent Ramp2000 ft

Conversion to pc/h Under Base Conditions

Ramp Junction Components Freeway Adjacent Ramp Volume, V (vph) 3650 600 710 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, v15 992 193 163 Trucks and buses % 6 5 5 Recreational vehicles 0 0 0 % Terrain type: Level Level Level Grade % % % Length mi mi mi Trucks and buses PCE, ET 15 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.971 0.976 0.976 Driver population factor, fP 1.00 1.00 1.00 4086 791 Flow rate, vp 668 pcph





Estimation of V<sub>12</sub> Merge Areas\_\_\_\_\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 0.594$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 2428 \text{ pc/h}$ 

\_\_Capacity Checks\_

Actual Maximum LOS F?

V<sub>FO</sub> 4877 7187 No

 $V_3$  or  $V_{av34}$  1658 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700 \text{ pc/h}$ ? No

 $Is \ V_3 \ or \ V_{av34} \! > \! 1.5 \ V_{12} \, / 2? \qquad \quad No$ 

If yes,  $V_{12A} = 2428$  (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area\_\_\_\_\_

Actual Max Desirable Violation?

V<sub>R12</sub> 4877 4600 No

Level of Service Determination (if not F)

Density,  $D_R$  = 5.475 + 0.00734  $V_R$  + 0.0078  $V_{12}\;$  - 0.00627  $L_A\;$  =  $\;$  26.5  $\;$  pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

\_Speed Estimation\_

Intermediate speed variable,  $M_S = 0.377$ 

Space mean speed in ramp influence area,  $S_R = 59.2$  mph

Space mean speed in outer lanes,  $S_0 = 65.4$  mph

Space mean speed for all vehicles, S = 61.2 mph



## HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Merge Analysis\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/8/2015
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-240 Westbound

Junction: On Ramp from Shields Blvd.

Jurisdiction: Oklahoma County

Analysis Year: 2013 [EXISTING CONFIGURATION]

Description: I-35\_I-240 Interchange Traffic Operational Analysis

\_Freeway Data

Type of analysis Merge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6

Free-flow speed on freeway 69.6 mph Volume on freeway 4240 vph

On Ramp Data

Side of freeway Right Number of lanes in ramp 1

Free-flow speed on ramp 35.0 mph
Volume on ramp 700 vph

Volume on ramp 700 vph
Length of first accel/decel lane 600 ft
Length of second accel/decel lane ft

\_Adjacent Ramp Data (if one exists)\_

Does adjacent ramp exist? Yes

Volume on adjacent Ramp
Position of adjacent Ramp
Type of adjacent Ramp
Distance to adjacent Ramp
On
Distance to adjacent Ramp
2000 ft

\_Conversion to pc/h Under Base Conditions\_

Junction Components Volume, V (vph) Freeway Ramp Adjacent Ramp 4240 700 650 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, v15 1152 190 177 v Trucks and buses 6 5 5 % Recreational vehicles 0 0 0 % Terrain type: Level Level Level Grade % % Length mi mi mi Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 0.976 0.976 Heavy vehicle adjustment, fHV 0.971 Driver population factor, fP 1.00 1.00 1.00

4747

780



pcph

724

Flow rate, vp



Estimation of V<sub>12</sub> Merge Areas\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 0594$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 2821 \text{ pc/h}$ 

Capacity Checks\_

Actual Maximum LOS F?

 $V_{FO} \hspace{1.5cm} 5527 \hspace{0.5cm} 7187 \hspace{0.5cm} No$ 

V<sub>3</sub> or V<sub>av34</sub> 1926 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700$  pc/h? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? No

If yes,  $V_{12A} = 2821$  (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_\_Flow Entering Merge Influence Area\_

Actual Max Desirable Violation?

 $V_{R12}$  5527 4600 No

Level of Service Determination (if not F)

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} - 0.00627 \ L_A = 29.4 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence D

\_\_\_\_Speed Estimation\_

Intermediate speed variable,  $M_S = 0.422$ 

Space mean speed in ramp influence area,  $S_R = 58.0$  mph

Space mean speed in outer lanes,  $S_0 = 64.5$  mph

Space mean speed for all vehicles, S = 60.1 mph



### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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E-mail: ramini@olssonassociates.com

\_Diverge Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates Date performed: 5/11/2015 AM Peak Hour Analysis time period: Freeway/Dir. of Travel: I-35 Northbound

Junction: Off Ramp to I-35 Northbound C-D Rd.

Oklahoma County Jurisdiction:

2040 [EXISTING CONFIGURATION] Analysis Year: I-35\_I-240 Interchange Traffic Operation Description:

Freeway Data

Type of analysis Diverge Number of lanes in freeway 3

69.6 Free-flow speed on freeway mph Volume on freeway 7030 vph

Off Ramp Data

Side of freeway Right Number of lanes in ramp 1 Free-Flow speed on ramp 45.0 mph Volume on ramp 2629 vph Length of first accel/decel lane 1500

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent ramp vph Position of adjacent ramp

Type of adjacent ramp Distance to adjacent ramp

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 7030 2629 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1910 714 Trucks and buses 8 10 % Recreational vehicles 0 0 0 Terrain type: Level Level 0.00% Grade 0.00% 0.00% 0.00 mi 0.00 mi 0.00 mi Length Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.962 0.952 1.000 Driver population factor, fP 1.00 1.00 1.00 Flow rate, vp 7947 3000 pcph





Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

Using Equation 5

 $P_{\rm FD} =$ 

0.423

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 5094$ 

pc/h

Capacity Checks

7187

7187

 $V_{FI} = V_F$ 

Actual 7947

LOS F? MaximumYes

 $V_{FO} = V_F - V_R$ 

4947

No

 $V_R$ 

3000

2100

 $V_3$  or  $V_{av34}$ 

2853 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

Yes

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A}$ =

5247

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

 $V_{12}$ 

Actual 5247

Max Desirable

Violation? Yes

Level of Service Determination (if not F)

Density,

 $D_R = 4.252 + 0.0086 \ V_{12} \text{ - } 0.009 \ L_D \ = \ 35.9 \ \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: F

Speed Estimation

Intermediate speed variable,

 $D_S = 0.568$ 

Space mean speed in ramp influence area,  $S_R = 53.9$  mph

Space mean speed in outer lanes,

 $S_0 = 69.7$  mph

Space mean speed for all vehicles,

S = 58.4mph





## HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_Diverge Analysis\_

Analyst: RA

Olsson Associates Agency/Co.: Date performed: 5/11/2015 PM Peak Hour Analysis time period: Freeway/Dir. of Travel: I-35 Northbound

Off Ramp to I-35 Northbound C-D Rd. Junction:

Jurisdiction: Oklahoma County

2040 [EXISTING CONFIGURATION] Analysis Year: I-35 I-240 Interchange Traffic Operation Description:

Freeway Data

Type of analysis Diverge Number of lanes in freeway 3 Free-flow speed on freeway 69.6

mph Volume on freeway 6897 vph

Off Ramp Data\_

Side of freeway Right Number of lanes in ramp 1 Free-Flow speed on ramp 45.0 mph 2299 Volume on ramp vph Length of first accel/decel lane 1500 ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? No

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Distance to adjacent ramp ft

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	6897	2299	0	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1874	625		V
Trucks and buses	8	10	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level		
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.952	1.000	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7797	2624	0	pcph





Estimation of V12 Diverge Areas\_

(Equation 13-12 or 13-13)  $L_{EQ} =$ 

 $P_{\text{FD}} =$ 0.444 Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 4923$ pc/h

Capacity Checks\_

LOS F? Actual Maximum

 $V_{FI} = V_F$ 7797 7187 Yes

 $V_{FO} = V_F - V_R$ 5173 7187 No 2624 2100 Yes

 $V_3$  or  $V_{av34}$ 2874 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 2700 pc/h? Yes

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ No

If yes,  $V_{12A}$ = 4097 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Actual Max Desirable Violation?  $V_{12}$ 5097 Yes

Level of Service Determination (if not F)\_

 $D_R = 4.252 + 0.0086 \ V_{12} - 0.009 \ L_D = 34.6 \ pc/mi/ln$ Density,

Level of service for ramp-freeway junction areas of influence: F

\_Speed Estimation\_

Intermediate speed variable,  $D_S = 0.534$ 

Space mean speed in ramp influence area,  $S_R = 54.9$  mph

Space mean speed in outer lanes,  $S_0 = 69.7$  mph

Space mean speed for all vehicles, S = 59.2



## HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/11/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: Off Ramp to SE 59<sup>th</sup> Street

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

### \_Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 6079 vph

## Off Ramp Data

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp254vphLength of first accel/decel lane0ft

## \_Adjacent Ramp Data (if one exists)\_

Does adjacent ramp exist? No

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Distance to adjacent ramp ft

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	6079	254	0	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1652	69		v
Trucks and buses	8	5	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level		
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.976	1.000	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6872	283	0	pcph





Estimation of V12 Diverge Areas\_

(Equation 13-12 or 13-13)  $L_{EQ} =$ 

 $P_{\text{FD}} =$ 0.575 Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 4073$ pc/h

\_Capacity Checks\_

LOS F? Actual Maximum

 $V_{FI} = V_F$ 6872 7187 No

 $V_{FO} = V_F - V_R$ 6589 7187 No

283 2100

 $V_3$  or  $V_{av34}$ 2799 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 2700 pc/h? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ No

If yes,  $V_{12A}$ = 4172 (Equation 13-15, 13-16, 13-18, or 13-19)

\_Flow Entering Diverge Influence Area\_

Violation? Actual Max Desirable  $V_{12}$ 4172 No

Level of Service Determination (if not F)\_

 $D_R = 4.252 + 0.0086 \ V_{12} - 0.009 \ L_D = 40.1 \ pc/mi/ln$ Density,

Level of service for ramp-freeway junction areas of influence: E

\_Speed Estimation\_

Intermediate speed variable,  $D_S = 0.323$ 

Space mean speed in ramp influence area,  $S_R = 60.7$  mph

Space mean speed in outer lanes,  $S_0 = 69.7$  mph

Space mean speed for all vehicles, S = 63.9mph



## HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/11/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: Off Ramp to SE 59<sup>th</sup> Street

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 6109 vph

\_\_\_Off Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp241vphLength of first accel/decel lane0ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Distance to adjacent ramp ft

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	6109	241	0	vph
Peak-hour factor, PHF	0.92	0.92	0.92	_
Peak 15-min volume, V <sub>15</sub>	1660	65		v
Trucks and buses	8	5	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level		
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.976	1.000	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6906	269	0	peph





\_\_\_\_Estimation of V12 Diverge Areas\_\_\_\_\_

 $L_{EQ} =$  (Equation 13-12 or 13-13)

 $P_{FD} = 0.575$  Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 4085$  pc/h

\_\_\_\_Capacity Checks

Actual Maximum LOS F?

 $V_{FI} = V_F$  6906 7187 No

 $V_{FO} = V_F - V_R$  6637 7187 No  $V_R$  269 2100 No

V<sub>3</sub> or V<sub>av34</sub> 2821 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700 \text{ pc/h}$ ? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$  No

If yes,  $V_{12A}$  = 4206 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area\_\_\_\_\_

Actual Max Desirable Violation?
V<sub>12</sub> 4206 4400 No

Level of Service Determination (if not F)

 $D_{R} = 4.252 + 0.0086 \ V_{12} \text{ - } 0.009 \ L_{D} \ = \ 40.4 \quad pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: E

Speed Estimation

Intermediate speed variable,  $D_S = 0.322$ 

Space mean speed in ramp influence area,  $S_R = 60.7$  mph

Space mean speed in outer lanes,  $S_0 = 69.7$  mph

0 (0.0

Space mean speed for all vehicles, S = 63.9 mph



## HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates Date performed: 5/11/2015 AM Peak Hour Analysis time period: Freeway/Dir. of Travel: I-240 Eastbound

Off Ramp to Shields Blvd. Junction:

Jurisdiction:

Oklahoma County 2040 [EXISTING CONFIGURATION] Analysis Year: Description: I-35\_I-240 Interchange Traffic Operation

## \_Freeway Data\_

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	69.6	mph
Volume on freeway	6444	vph

## \_Off Ramp Data\_

Right	
1	
35.0	mph
762	vph
350	ft
	1 35.0 762

## \_\_Adjacent Ramp Data (if one exists)\_

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	699	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1600 ft	

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	6444	762	699	vph
Peak-hour factor, PHF	0.92	0.92	0.92	•
Peak 15-min volume, V <sub>15</sub>	1751	207	190	v
Trucks and buses	7	5	5	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level		
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.976	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7249	849	779	pcph





Estimation of V12 Diverge Areas\_

3597.06  $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{\text{FD}} =$ 

0.540

Using Equation 5

LOS F?

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 4303$ 

pc/h

Capacity Checks

Actual Maximum

 $V_{FI}\!=V_F$ 

7249

7187

Yes

 $V_{FO} = V_F - V_R$ 

6400

7187 No

849

2000 No

 $V_3$  or  $V_{av34}$ 

2946

pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

Yes

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A}$ =

4549

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

 $V_{12}$ 

Actual 4549

Max Desirable

Violation? Yes

Level of Service Determination (if not F)\_

Density,

 $D_R = 4.252 + 0.0086 \ V_{12} - 0.009 \ L_D = 40.2 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: F

\_Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.504$ 

Space mean speed in ramp influence area,  $S_R = 55.7$  mph

Space mean speed in outer lanes,

 $S_0 = 69.7$ mph

mph

Space mean speed for all vehicles, S = 60.2





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\_\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/8/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Junction: Off Ramp to Shields Blvd.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

### Freeway Data\_

Type of analysis Diverge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 6896 vph

## \_Off Ramp Data\_

Side of freeway Right Number of lanes in ramp 1

Free-Flow speed on ramp
Volume on ramp
Length of first accel/decel lane

35.0 mph
927 vph
15.0 mph
16.0 mph
16.

## \_Adjacent Ramp Data (if one exists)\_

Does adjacent ramp exist? Yes Volume on adjacent ramp 826 vph

Position of adjacent ramp
Type of adjacent ramp
Distance to adjacent ramp
Upstream
Off
1600 ft

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	6896	927	826	vph
Peak-hour factor, PHF	0.92	0.92	0.92	_
Peak 15-min volume, V <sub>15</sub>	1874	252	224	V
Trucks and buses	7	5	5	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.976	1.000	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7758	1033	920	pcph





Estimation of V12 Diverge Areas\_

3597.06  $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{\text{FD}} =$ 

0.519

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 4520$ 

pc/h

Capacity Checks

7187

LOS F? Actual Maximum Yes

6725

 $V_{FI}\!=V_F$ 7758

7187

No

 $V_{FO} = V_F - V_R$ 

1033 2100

No

 $V_3$  or  $V_{av34}$ 

3238

pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

Yes

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A}$ =

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

 $V_{12}$ 

Actual 5058

5058

Max Desirable

Violation? Yes

Level of Service Determination (if not F)\_

Density,

 $D_R = 4.252 + 0.0086 \ V_{12} - 0.009 \ L_D = 44.6 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: F

\_Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.521$ 

Space mean speed in ramp influence area,  $S_R = 55.2$  mph

Space mean speed in outer lanes,

 $S_0 = 69.7$  mph

Space mean speed for all vehicles,

S = 59.5mph





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\_\_\_\_\_\_\_Diverge Analysis\_\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/11/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Junction: Off Ramp to Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35 I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge Number of lanes in freeway 2

Free-flow speed on freeway 69.6 mph Volume on freeway 3532 vph

\_\_Off Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp445vphLength of first accel/decel lane230ft

\_Adjacent Ramp Data (if one exists)\_\_\_\_

Does adjacent ramp exist?

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Distance to adjacent ramp ft

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	3532	445	0	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	960	121		v
Trucks and buses	7	5	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level		
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.976	1.000	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3973	496	0	pcph





Estimation of V12 Diverge Areas

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

1.000

Using Equation 5

LOS F?

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3973$ 

Capacity Checks

4791

 $V_{FI}\!=V_F$ 

Actual 3973

Maximum 4791

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

3477

 $V_{R}$ 

No

2100 496

No

 $V_3$  or  $V_{av34}$ 

0 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

If yes,  $V_{12A}$ =

3973

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Actual

Max Desirable

Violation? No

3973 4400

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 \ V_{12} \text{ - } 0.009 \ L_D \ = \ 36.3 \ \ pc/mi/ln$ 

Level of Service Determination (if not F)\_

Level of service for ramp-freeway junction areas of influence: E

Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.343$ 

Space mean speed in ramp influence area,  $S_R = 60.1$  mph

Space mean speed in outer lanes,

 $S_0 = N/A$  mph

Space mean speed for all vehicles,

S = 60.1mph





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\_\_\_\_Diverge Analysis\_\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/8/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound
Junction: Off Ramp to Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35 I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge Number of lanes in freeway 2

Free-flow speed on freeway 69.6 mph Volume on freeway 3475 vph

\_\_Off Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp445vphLength of first accel/decel lane230ft

\_Adjacent Ramp Data (if one exists)\_\_

Does adjacent ramp exist?

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Distance to adjacent ramp ft

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	3475	445	0	vph
Peak-hour factor, PHF	0.92	0.92	0.92	•
Peak 15-min volume, V <sub>15</sub>	944	121		v
Trucks and buses	7	5	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level		
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.976	1.000	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3909	496	0	pcph





 $V_{FO} = V_F - V_R$ 

# I-35\_I-240 INTERCHANGE

\_Estimation of V12 Diverge Areas\_\_\_\_\_

No

 $L_{EQ} =$  (Equation 13-12 or 13-13)

 $P_{FD} = 1.000$  Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3909$  pc/h

\_\_\_Capacity Checks

4791

Actual Maximum LOS F?

3413

 $V_{FI} = V_{F}$  3909 4791 No

V<sub>R</sub> 496 2100 No

 $V_3$  or  $V_{av34}$  0 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700 \text{ pc/h}$ ? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$  No

If yes,  $V_{12A}$  = 3909 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area\_\_\_\_\_

Actual Max Desirable Violation?
V<sub>12</sub> 3909 4400 No

Level of Service Determination (if not F)\_\_\_\_\_

Density,  $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 35.8 \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: E

Speed Estimation

Intermediate speed variable,  $D_S = 0.343$ 

Space mean speed in ramp influence area,  $S_R = 60.1$  mph

Space mean speed in outer lanes,  $S_0 = N/A$  mph

Space mean speed for all vehicles, S = 60.1 mph



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Merge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/11/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: On Ramp from Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Analysis

Freeway Data\_\_\_\_\_

Type of analysis Merge Number of lanes in freeway 2

Free-flow speed on freeway 69.6 mph Volume on freeway 2820 vph

On Ramp Data\_\_\_\_\_

Side of freewayRightNumber of lanes in ramp1Free-flow speed on ramp45.0mphVolume on ramp508vphLength of first accel/decel lane500ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent Ramp vph

Position of adjacent Ramp Type of adjacent Ramp

Distance to adjacent Ramp ft

\_\_Conversion to pc/h Under Base Conditions\_\_\_\_\_

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 2820 508 vph Peak-hour factor, PHF 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 766 138 Trucks and buses % 5 0 Recreational vehicles 0 Terrain type: Level Level Grade % Length mi mi mi Trucks and buses PCE, ET 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 Heavy vehicle adjustment, fHV 0.966 0.976 1.00 1.00 Driver population factor, fP Flow rate, vp 3172 566 pcph





Estimation of V<sub>12</sub> Merge Areas\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 1.000$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 3172$  pc/h

Capacity Checks\_

Actual Maximum LOS F?

 $V_{FO} \hspace{1.5cm} 3738 \hspace{0.5cm} 4791 \hspace{0.5cm} No$ 

V<sub>3</sub> or V<sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700$  pc/h? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? No

If yes,  $V_{12A} = 3172$  (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_Flow Entering Merge Influence Area\_

Actual Max Desirable Violation?

 $V_{R12}$  3738 4600 No

Level of Service Determination (if not F)

Speed Estimation

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} - 0.00627 \ L_A = 31.2 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence D

Intermediate speed variable,  $M_S = 0.440$ 

Space mean speed in ramp influence area,  $S_R = 57.5$  mph

Space mean speed in outer lanes,  $S_O = N/A \quad mph \label{eq:Someone}$ 

Space mean speed for all vehicles, S = 57.5 mph



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Merge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/11/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: On Ramp from Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Analysis

Freeway Data

Type of analysis Merge Number of lanes in freeway 2

Free-flow speed on freeway 69.6 mph Volume on freeway 3348 vph

On Ramp Data\_\_\_\_\_

Side of freewayRightNumber of lanes in ramp1Free-flow speed on ramp45.0mphVolume on ramp445vphLength of first accel/decel lane500ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent Ramp vph

Position of adjacent Ramp Type of adjacent Ramp

Distance to adjacent Ramp ft

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	3348	445	vph
Peak-hour factor, PHF	0.92	0.92	•
Peak 15-min volume, V <sub>15</sub>	726	95	v
Trucks and buses	7	5	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	%	%	%
Length	mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.976	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3766	496	pcph





\_Estimation of V<sub>12</sub> Merge Areas\_\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 1.000$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 3766 \text{ pc/h}$ 

Capacity Checks\_

Actual Maximum LOS F?

 $V_{FO} \hspace{1.5cm} 4262 \hspace{0.5cm} 4791 \hspace{0.5cm} No$ 

V<sub>3</sub> or V<sub>av34</sub> 0 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700$  pc/h? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? No

If yes,  $V_{12A} = 3766$  (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_Flow Entering Merge Influence Area\_

Actual Max Desirable Violation?

 $V_{R12}$  4262 4600 No

\_\_\_\_\_Level of Service Determination (if not F)

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} - 0.00627 \ L_A = 35.4 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,  $M_S = 0.553$ 

Space mean speed in ramp influence area,  $S_R = 54.3$  mph

 $Space \ mean \ speed \ in \ outer \ lanes, \qquad \qquad S_O = N/A \quad mph$ 

Space mean speed for all vehicles, S = 54.3 mph



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E-mail: ramini@olssonassociates.com

Merge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/11/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: On Ramp from Shields Blvd.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

-	D .
Freeway	I lata

Type of analysis	Merge
Number of lanes in freeway	3

Free-flow speed on freeway 69.6 mph Volume on freeway 4636 vph

## \_On Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-flow speed on ramp35.0mphVolume on ramp902vphLength of first accel/decel lane600ft

## \_Adjacent Ramp Data (if one exists) \_\_\_\_

Does adjacent ramp exist?

Volume on adjacent Ramp
Position of adjacent Ramp
Type of adjacent Ramp
Downstream
On
Distance to adjacent Ramp
2000 ft

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	4636	902	762	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1260	245	207	v
Trucks and buses	7	5	5	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.976	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5190	1005	849	pcph





Estimation of V<sub>12</sub> Merge Areas\_\_\_\_\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 0.594$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 3084$  pc/h

\_Capacity Checks\_

Actual Maximum LOS F?

V<sub>FO</sub> 6195 7187 No

 $V_3 \ or \ V_{av34} \hspace{1.5cm} 2106 \ \ pc/h \hspace{0.5cm} \text{(Equation 13-14 or 13-17)}$ 

Is  $V_3$  or  $V_{av34} > 2700 \text{ pc/h}$ ? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? No

If yes,  $V_{12A} = 3084$  (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_\_Flow Entering Merge Influence Area\_\_\_\_\_

Actual Max Desirable Violation?

V<sub>R12</sub> 4089 4600 No

Level of Service Determination (if not F)

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} - 0.00627 \ L_A = 33.1 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence D

\_Speed Estimation\_

Intermediate speed variable,  $M_S = 0.512$ 

Space mean speed in ramp influence area,  $S_R = 55.5$  mph

Space mean speed in outer lanes,  $S_0 = 63.8$  mph

Space mean speed for all vehicles, S = 58.1 mph



## HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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E-mail: ramini@olssonassociates.com

Merge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/11/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: On Ramp from Shields Blvd.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Freeway	I lata

Type of analysis	Merge
Number of lanes in freeway	3

Free-flow speed on freeway 69.6 mph Volume on freeway 5384 vph

## \_On Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-flow speed on ramp35.0mphVolume on ramp889vphLength of first accel/decel lane600ft

## \_Adjacent Ramp Data (if one exists) \_\_

Does adjacent ramp exist?YesVolume on adjacent Ramp826vphPosition of adjacent RampDownstreamType of adjacent RampOnDistance to adjacent Ramp2000ft

Junction Components	Freeway	Ramp	Adjacent l	Ramp
Volume, V (vph)	5384	889	826	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1463	242	224	V
Trucks and buses	7	5	5	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.976	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6028	990	920	pcph





Estimation of V<sub>12</sub> Merge Areas\_\_\_\_\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 0.594$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 3582$  pc/h

\_Capacity Checks\_

Actual Maximum LOS F?

 $V_{FO} \hspace{1.5cm} 7018 \hspace{0.5cm} 7187 \hspace{0.5cm} No$ 

 $V_3 \text{ or } V_{av34}$  2446 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700 \text{ pc/h}$ ? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? No

If yes,  $V_{12A} = 3582$  (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_\_Flow Entering Merge Influence Area\_\_\_\_\_

Actual Max Desirable Violation?

 $V_{R12}$  4572 4600 No

Level of Service Determination (if not F)

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} - 0.00627 \ L_A = 36.9 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence E

\_Speed Estimation\_

Intermediate speed variable,  $M_S = 0.656$ 

Space mean speed in ramp influence area,  $S_R = 51.5$  mph

Space mean speed in outer lanes,  $S_0 = 62.2$  mph

Space mean speed for all vehicles, S = 54.8 mph



## HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_Merge Analysis\_

Analyst: RA

Agency/Co.:Olsson AssociatesDate performed:5/12/2015Analysis time period:AM Peak HourFreeway/Dir. of Travel:I-35 Northbound

Junction: On Ramp from SE 89<sup>th</sup> St.
Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

Freeway Data

Type of analysis Merge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 6395 vph

\_\_\_\_On Ramp Data\_

Side of freeway Right Number of lanes in ramp 1

Free-flow speed on ramp 45.0 mph Volume on ramp 826 vph

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent Ramp Position of adjacent Ramp Type of adjacent Ramp

vph

Type of adjacent Ramp
Distance to adjacent Ramp

It

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	6395	826	vph
Peak-hour factor, PHF	0.92	0.92	_
Peak 15-min volume, V <sub>15</sub>	1738	224	V
Trucks and buses	7	10	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	%	%	
Length	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	7194	943	pcph





This ramp is designed as a major merge and according to the Highway Capacity Manual 2010; there are no effective models of performance for a major merge area. Therefore, analysis is limited to checking capacities on the approaching legs and the downstream freeway segment. A merge failure would be indicated by a v/c ratio in excess of 1.00. LOS cannot be determined for major merge areas.

v/c = 7194/7050 = 1.02Freeway-upstream, v/c = 943/2100 = 0.45Ramp Freeway-downstream v/c = 8163/9400 = 0.87





### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_\_\_\_Merge Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: On Ramp from SE 89<sup>th</sup> St. Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35 I-240 Interchange Traffic Analysis

Freeway Data\_\_\_\_

Type of analysis Merge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 6335 vph

On Ramp Data\_\_\_\_\_

Side of freeway Right
Number of lanes in ramp 1
Free-flow speed on ramp 45.0

 $\begin{array}{cccc} \text{Free-flow speed on ramp} & 45.0 & \text{mph} \\ \text{Volume on ramp} & 826 & \text{vph} \end{array}$ 

\_\_\_\_\_Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist?

Volume on adjacent Ramp vph Position of adjacent Ramp

Type of adjacent Ramp
Distance to adjacent Ramp
ft

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	6335	826	vph
Peak-hour factor, PHF	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1721	224	v
Trucks and buses	7	10	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	%	%	
Length	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	7127	943	pcph





This ramp is designed as a major merge and according to the Highway Capacity Manual 2010; there are no effective models of performance for a major merge area. Therefore, analysis is limited to checking capacities on the approaching legs and the downstream freeway segment. A merge failure would be indicated by a v/c ratio in excess of 1.00. LOS cannot be determined for major merge areas.

v/c = 7127/7050 = 1.01Freeway-upstream, v/c = 943/2100 = 0.45Ramp

Freeway-downstream v/c = 8056/9400 = 0.86





### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Diverge Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates 5/12/2015 Date performed: Analysis time period: AM Peak Hour I-35 Northbound Freeway/Dir. of Travel:

Off Ramp to I-240 Eastbound Junction:

Jurisdiction: Oklahoma County

2040 [PROPOSED DESIGN] Analysis Year:

I-35\_I-240 Interchange Traffic Operation Description:

#### Freeway Data

Diverge Type of analysis

Number of lanes in freeway 4 69.6 Free-flow speed on freeway mph

Volume on freeway 7221

## Off Ramp Data

Side of freeway Right Number of lanes in ramp 2 Free-Flow speed on ramp 45.0 mph Volume on ramp 2844 vph Length of first accel/decel lane 500 ft Length of Second accel/decel lane

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes

Volume on adjacent ramp 1207 vph Position of adjacent ramp Downstream

Type of adjacent ramp On

Distance to adjacent ramp 1300 ft

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	7221	2844	1207	vph
Peak-hour factor, PHF	0.92	0.92	0.92	_
Peak 15-min volume, V <sub>15</sub>	1962	773	328	v
Trucks and buses	8	9	13	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.957	0.939	





 Driver population factor, fP
 1.00
 1.00
 1.00

 Flow rate, vp
 8163
 3230
 1397
 pcph

\_\_Estimation of V12 Diverge Areas\_

 $L_{EQ} =$  (Equation 13-12 or 13-13)

 $P_{FD} = 0.260$  Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 4513$  pc/h

\_Capacity Checks\_\_\_\_

 $\begin{array}{cccc} & & Actual & Maximum & LOS \ F? \\ V_{FI} = V_F & & 8163 & 9583 & No \end{array}$ 

 $V_{FO} = V_F - V_R$  4933 9583 No

 $V_R \hspace{1.5cm} 3230 \hspace{0.5cm} 4200 \hspace{0.5cm} No$ 

 $V_3$  or  $V_{av34}$  1825 pc/h (Equation 13-14 or 13-17)

 $\label{eq:local_state} \text{Is} \quad V_3 \text{ or } V_{av34} > \qquad \qquad 2700 \text{ pc/h?} \qquad \qquad \text{No}$ 

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$  No

If yes,  $V_{12A}$  = 4513 (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_\_Flow Entering Diverge Influence Area

Actual Max Desirable Violation?
V<sub>12</sub> 4513 4400 Yes

V<sub>12</sub> 4513 4400 Yes

Level of Service Determination (if not F)\_\_\_\_\_

Density,  $D_{R} = 4.252 + 0.0086 \ V_{12} - 0.009 \ L_{D} = 29.6 \quad pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: D

\_\_\_\_Speed Estimation\_

 $D_S = 0.589$  Intermediate speed variable,

Space mean speed in ramp influence area,  $S_R = 53.4$  mph

Space mean speed in outer lanes,  $S_0 = 73.1$  mph

Space mean speed for all vehicles, S = 60.7 mph



### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Diverge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: Off Ramp to I-240 Eastbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

### Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 4
Free-flow speed on freeway 69.6 mph
Volume on freeway 7161 vph

### Off Ramp Data

 Side of freeway
 Right

 Number of lanes in ramp
 2

 Free-Flow speed on ramp
 45.0
 mph

 Volume on ramp
 2531
 vph

 Length of first accel/decel lane
 500
 ft

 Length of Second accel/decel lane
 500
 ft

## \_Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent ramp
Position of adjacent ramp
Type of adjacent ramp
Downstream
On
Distance to adjacent ramp
1300
ft

## \_\_Conversion to pc/h Under Base Conditions\_\_\_\_\_

Junction Components Adjacent Ramp Freeway Ramp Volume, V (vph) 7161 2531 1142 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1946 688 310 Trucks and buses 8 13 % 0 Recreational vehicles 0 0 Terrain type: Level Level Level Grade 0.00% 0.00% 0.00% Length 0.00 mi 0.00 mi 0.00 mi Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 0.939 Heavy vehicle adjustment, fHV 0.962 0.957





0.260

\_Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

No

No

 $P_{FD} =$ 

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 4232$ 

pc/h

Capacity Checks

 $V_{FO} = V_F - V_R$  5220 9583

 $V_R$  2875

4200 No

 $V_{3} \ or \ V_{av34} \\ \hspace*{1.5cm} 1931 \ pc/h \\ \hspace*{1.5cm} \text{(Equation 13-14 or 13-17)}$ 

Is  $V_3$  or  $V_{av34} > 2700 \text{ pc/h}$ ?

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$  No

If yes,  $V_{12A}$  = 4232 (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_Flow Entering Diverge Influence Area\_

 $\begin{array}{ccc} & & Actual & Max \ Desirable \\ V_{12} & & 4232 & 4400 \end{array}$ 

Violation? No

Level of Service Determination (if not F)

Density,  $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 27.1 \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: C

\_\_\_\_\_Speed Estimation

Intermediate speed variable,  $D_S = 0.557$ 

Space mean speed in ramp influence area,  $S_R = 54.2$  mph

Space mean speed in outer lanes,  $S_0 = 72.7$  mph

Space mean speed for all vehicles, S = 62.7 mpl



#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_Merge Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: On Ramp from I-240 Eastbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

\_Freeway Data

Type of analysis Merge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6

Free-flow speed on freeway 69.6 mph Volume on freeway 4377 vph

On Ramp Data

Side of freeway Right

Number of lanes in ramp 1
Free-flow speed on ramp 30.0 mph

Volume on ramp 1207 vph
Length of first accel/decel lane 500 ft

\_Adjacent Ramp Data (if one exists)

vph

Does adjacent ramp exist? Yes Volume on adjacent Ramp 613

Type of adjacent Ramp

Type of adjacent Ramp

Type of adjacent Ramp

On

Distance to adjacent Ramp 1160 ft

\_Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 4377 1207 613 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1208 298 167 Trucks and buses 8 13 14 % 0 Recreational vehicles 0 0 % Terrain type: Level Level Level Grade % % Length mi mi mi Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 0.935 Heavy vehicle adjustment, fHV 0.962 0.939 Driver population factor, fP 1.00 1.00 1.00 4948 1397 Flow rate, vp 713 pcph





_Estimation of	V <sub>12</sub> Merge Areas	
----------------	-----------------------------	--

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 0.591$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 2972$  pc/h

## \_Capacity Checks\_

Actual Maximum LOS F?

V<sub>FO</sub> 6345 7187 No

V<sub>3</sub> or V<sub>av34</sub> 2021 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700$  pc/h? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? No

If yes,  $V_{12A} = 2927$  (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_\_Flow Entering Merge Influence Area\_

Actual Max Desirable Violation?

 $V_{R12}$  3640 4600 No

Level of Service Determination (if not F)

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} - 0.00627 \ L_A = 35.4 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence  $\boldsymbol{E}$ 

\_\_\_\_Speed Estimation\_

Intermediate speed variable,  $M_S = 0.585$ 

Space mean speed in ramp influence area,  $S_R = 53.4$  mph

Space mean speed in outer lanes,  $S_0 = 64.1$  mph

Space mean speed for all vehicles, S = 56.4 mph





## HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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lerge 1		

Analyst: RA

Agency/Co.: Olsson Associates Date performed: 5/12/2015 PM Peak Hour Analysis time period: Freeway/Dir. of Travel: I-35 Northbound

On Ramp from I-240 Eastbound Junction:

Jurisdiction: Oklahoma County

2040 [PROPOSED DESIGN] Analysis Year:

I-35\_I-240 Interchange Traffic Analysis Description:

### Freeway Data

Type of analysis Merge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 4630 vph

## On Ramp Data

Side of freeway Right Number of lanes in ramp Free-flow speed on ramp 30.0 mph Volume on ramp 1142 vph Length of first accel/decel lane 500 ft

## Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes

Volume on adjacent Ramp 371 vph

Position of adjacent Ramp Downstream

Type of adjacent Ramp On Distance to adjacent Ramp 1160

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	4630	1142	371	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1258	310	101	v
Trucks and buses	8	13	14	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.939	0.935	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5234	1322	431	pcph





Estimation of V<sub>12</sub> Merge Areas\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 0.591$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 3096$  pc/h

Capacity Checks\_

Actual Maximum LOS F?

V<sub>FO</sub> 6556 7187 No

V<sub>3</sub> or V<sub>av34</sub> 2138 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700$  pc/h? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? No

If yes,  $V_{12A} = 3096$  (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_Flow Entering Merge Influence Area\_

Actual Max Desirable Violation?

 $V_{R12}$  3527 4600 No

Level of Service Determination (if not F)

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} - 0.00627 \ L_A = 36.2 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence E

\_\_\_\_\_Speed Estimation\_\_

 $Intermediate \ speed \ variable, \qquad \qquad M_S = 0.614$ 

Space mean speed in ramp influence area,  $S_R = 52.6$  mph

Space mean speed in outer lanes,  $S_0 = 63.7$  mph

Space mean speed for all vehicles, S = 55.8 mph



#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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1.4	lerge.	Ano	voic.

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: On Ramp from I-240 Eastbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

#### Freeway Data\_

Type of analysis Merge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 4377 vph

### \_On Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-flow speed on ramp30.0mphVolume on ramp1207vphLength of first accel/decel lane500ft

#### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes
Volume on adjacent Ramp 2844 vph
Position of adjacent Ramp Upstream

Type of adjacent Ramp Off
Distance to adjacent Ramp 1300

#### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	4377	1207	2844	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1189	328	773	V
Trucks and buses	8	13	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.939	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4948	1397	3230	pcph





	_Estimation	n of V <sub>12</sub> Merge Areas				
$L_{EQ} =$	746.43	(Equation 13-6 or 13-7)				
$P_{FM} =$	0.591	Using Equation 1				
$V_{12} = V_F (P_{FM}) =$	2927	pc/h				
	Ca	pacity Checks				
	Actual	Maximum LOS F?				
$ m V_{FO}$	6345	7187 No				
$V_3$ or $V_{av34}$	2021	pc/h (Equation 13-14 or 13-17)				
Is $V_3$ or $V_{av34} > 2700$ pc/h?	No					
Is $V_3$ or $V_{av34} > 1.5 V_{12}/2$ ?	No					
If yes, $V_{12A} = 2927$		(Equation 13-15, 13-16, 13-18, or 13-19)				
	Flow Enter	ing Merge Influence Area				
	Actual	Max Desirable Violation?				
$V_{R12}$	4329	4600 No				
Leve	el of Service	Determination (if not F)				
Density, $D_R = 5.475 + 0.00734$	$V_R + 0.007$	$18 V_{12} - 0.00627 L_A = 35.4 \text{ pc/mi/ln}$				
Level of service for ramp-freev	way junction	n areas of influence E				
	Spee	d Estimation				
Intermediate speed variable,		$M_S = 0.585$				
Space mean speed in ramp infl	uence area,	$S_R = 53.4$ mph				
Space mean speed in outer land	es,	$S_0 = 64.1 \text{ mph}$				
Space mean speed for all vehic	eles,	S = 56.4 mph				



### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Merge	Analysis	

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: On Ramp from I-240 Eastbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

#### Freeway Data\_

Type of analysis Merge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 4630 vph

### \_On Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-flow speed on ramp30.0mphVolume on ramp1142vph

Volume on ramp 1142 vph Length of first accel/decel lane 500 ft

### \_Adjacent Ramp Data (if one exists) \_\_

Does adjacent ramp exist? Yes
Volume on adjacent Ramp 2531 vph
Position of adjacent Ramp Upstream

Type of adjacent Ramp Off

Distance to adjacent Ramp 1300

#### \_Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacen	t Ramp
Volume, V (vph)	4630	1142	2531	vph
Peak-hour factor, PHF	0.92	0.92	0.92	_
Peak 15-min volume, V <sub>15</sub>	1258	310	688	V
Trucks and buses	8	13	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.939	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5234	1322	2875	pcph





	Estimation	n of V <sub>12</sub> Merge Areas				
$L_{EO} = 791.58$ (Equation 13-6 or 13-7)						
$P_{FM} =$	0.591	Using Equation 1				
$V_{12} = V_F (P_{FM}) =$	3096	pc/h				
Capacity Checks						
	Actual	Maximum LOS F?				
$ m V_{FO}$	6556	7200 No				
$V_3$ or $V_{av34}$	2138	pc/h (Equation 13-14 or 13-17)				
Is $V_3$ or $V_{av34} > 2700$ pc/h?	No					
Is $V_3$ or $V_{av34} > 1.5 V_{12}/2?$	No					
If yes, $V_{12A} = 3096$		(Equation 13-15, 13-16, 13-18, or 13	-19)			
	Flow Enteri	ing Merge Influence Area				
	Actual	Max Desirable Violation?				
$V_{R12}$	4418	4600 No				
Leve	Level of Service Determination (if not F)					
	. 01 501 1100	Determination (II not r)				
Density, $D_R = 5.475 + 0.00734$		8 V <sub>12</sub> - 0.00627 L <sub>A</sub> = 36.2 pc/mi/ln				
Density, $D_R = 5.475 + 0.00734$ Level of service for ramp-freev	$V_R + 0.0078$	$8 V_{12} - 0.00627 L_A = 36.2 \text{ pc/mi/ln}$				
	$V_R + 0.0073$	$8 V_{12} - 0.00627 L_A = 36.2 \text{ pc/mi/ln}$				
	$V_R + 0.0073$	$8 V_{12} - 0.00627 L_A = 36.2 \text{ pc/mi/ln}$ areas of influence E				
Level of service for ramp-freev	V <sub>R</sub> + 0.0073 way junction Speed	$8 \ V_{12} - 0.00627 \ L_A = 36.2 \ \text{pc/mi/ln}$ areas of influence E d Estimation $M_S = 0.614$				
Level of service for ramp-freev  Intermediate speed variable,	$V_R + 0.007$ way junction Speed	$8 \ V_{12} - 0.00627 \ L_A = 36.2 \ \text{pc/mi/ln}$ areas of influence E d Estimation $M_S = 0.614$				





### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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lerge		

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: On Ramp from I-240 Westbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

#### Freeway Data\_

Type of analysis Merge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 5584 vph

### \_On Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-flow speed on ramp45.0Volume on ramp613Length of first accel/decel lane1000

Adjacent Ramp Data (if one exists)

mph

vph

ft

Does adjacent ramp exist? Yes
Volume on adjacent Ramp 1207 vph
Position of adjacent Ramp Upstream
Type of adjacent Ramp On

Distance to adjacent Ramp 1200 ft

#### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	5584	613	1207	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1517	167	328	V
Trucks and buses	8	13	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.939	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6312	710	1371	pcph





Estimation of V<sub>12</sub> Merge Areas\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 0.605$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 3822$  pc/h

Capacity Checks\_

Actual Maximum LOS F?

V<sub>FO</sub> 7022 7187 No

V<sub>3</sub> or V<sub>av34</sub> 2490 pc/h (Equation 13-14 or 13-17)

 $Is \quad V_3 \text{ or } V_{av34} \! > \! 2700 \text{ pc/h?} \qquad \quad No$ 

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? No

If yes,  $V_{12A} = 3822$  (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_\_Flow Entering Merge Influence Area\_

Actual Max Desirable Violation?

 $V_{R12}$  4532 4600 No

\_\_\_\_\_Level of Service Determination (if not F) \_\_\_\_\_

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} - 0.00627 \ L_A = 34.2 \ pc/mi/ln$ 

Speed Estimation

Level of service for ramp-freeway junction areas of influence D

-

Intermediate speed variable,  $M_S = 0.593$ 

Space mean speed in ramp influence area,  $S_R = 53.2$  mph

Space mean speed in outer lanes,  $S_0 = 61.9$  mph

Space mean speed for all vehicles, S = 56.0 mph





### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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 Merg	ge A	naiy	S1S_	 

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Junction: On Ramp from I-240 Westbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

#### Freeway Data\_\_\_\_

Type of analysis Merge
Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 5772 vph

### \_On Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-flow speed on ramp45.0mphVolume on ramp371vphLength of first accel/decel lane1000ft

#### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes
Volume on adjacent Ramp 1142 vph
Position of adjacent Ramp Upstream
Type of adjacent Ramp On

Distance to adjacent Ramp 1200

#### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	5772	371	1142	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1568	101	310	V
Trucks and buses	8	13	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.939	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6525	367	1297	pcph





\_\_Estimation of V<sub>12</sub> Merge Areas\_\_\_\_\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 0.605$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 3951$  pc/h

Capacity Checks\_

Actual Maximum LOS F?

V<sub>FO</sub> 6892 7187 No

V<sub>3</sub> or V<sub>av34</sub> 2574 pc/h (Equation 13-14 or 13-17)

 $Is \quad V_3 \text{ or } V_{av34} \! > \! 2700 \text{ pc/h?} \qquad \quad No$ 

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? No

If yes,  $V_{12A} = 3951$  (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

Actual Max Desirable Violation?

 $V_{R12}$  4318 4600 No

Level of Service Determination (if not F)

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} - 0.00627 \ L_A = 32.7 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence D

\_\_\_\_Speed Estimation\_

 $Intermediate \ speed \ variable, \qquad \qquad M_S = 0.524$ 

Space mean speed in ramp influence area,  $S_R = 55.1$  mph

Space mean speed in outer lanes,  $S_0 = 61.4$  mph

Space mean speed for all vehicles, S = 57.3 mph



### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound
Junction: Off Ramp to SE 59th St.
Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

\_Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 6197 vph

\_Off Ramp Data

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp433vphLength of first accel/decel lane1500ft

\_\_Adjacent Ramp Data (if one exists)\_\_\_\_\_

Does adjacent ramp exist? No

Volume on adjacent ramp vph

Position of adjacent ramp
Type of adjacent ramp
Distance to adjacent ramp
ft

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp 6197 Volume, V (vph) 433 vph Peak-hour factor, PHF 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1684 118 Trucks and buses 8 3 % Recreational vehicles 0 0 % Terrain type: Level Level Grade 0.00% 0.00% Length 0.00 mi0.00 mi Trucks and buses PCE, ET 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 Heavy vehicle adjustment, fHV 0.962 0.985 Driver population factor, fP 1.00 1.00 Flow rate, vp 7005 478 pcph





Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.563

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 4152$ 

pc/h

Capacity Checks

 $V_{FI} = V_F$ 

Actual 7005

Maximum 7187

LOS F?

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

6527

7187 2100 No

 $V_{\text{R}}$ 

478

No

V<sub>3</sub> or V<sub>av34</sub>

2853 pc/h

(Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

Yes

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A} =$ 

4305

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Actual 4305

Max Desirable 4400

Violation?

No

Level of Service Determination (if not F)

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 27.8 \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: C

Speed Estimation

Intermediate speed variable,

 $D_S = 0.341$ 

Space mean speed in ramp influence area,  $S_R = 60.2$  mph

Space mean speed in outer lanes,

 $S_0 = 69.7$  mph

Space mean speed for all vehicles,

S = 63.5mph





### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Diverge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound
Junction: Off Ramp to SE 59<sup>th</sup> St.
Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35 I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 6143 vph

\_\_Off Ramp Data\_\_\_\_\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp467vph

Volume on ramp 467 vph Length of first accel/decel lane 1500 ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent ramp vph

Position of adjacent ramp
Type of adjacent ramp

Distance to adjacent ramp

Conversion to pc/h Under Base Conditions\_

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 6143 467 vph Peak-hour factor, PHF 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1669 127 Trucks and buses % 8 3 0 Recreational vehicles 0 Terrain type: Level Level Grade 0.00%0.00% 0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 Heavy vehicle adjustment, fHV 0.962 0.985 Driver population factor, fP 1.00 1.00 Flow rate, vp 6944 515 pcph





\_Estimation of V12 Diverge Areas\_\_

 $L_{EQ} =$  (Equation 13-12 or 13-13)

 $P_{FD} = 0.563$  Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 4133$  pc/h

\_Capacity Checks\_

 $V_{FO} = V_F - V_R$  6429 7187 No

 $V_R$  515 2100 No

 $V_3$  or  $V_{av34}$  2211 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34}$  > 2700 pc/h? Yes

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$  No

If yes,  $V_{12A}$  = 4244 (Equation 13-15, 13-16, 13-18, or 13-19)

\_Flow Entering Diverge Influence Area\_

Level of Service Determination (if not F)\_\_\_\_\_

Density,  $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 27.3 \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: C

Speed Estimation

Intermediate speed variable,  $D_S = 0.344$ 

Space mean speed in ramp influence area,  $S_R = 60.1$  mph

Space mean speed in outer lanes,  $S_0 = 69.7$  mph

Space mean speed for all vehicles, S = 63.5 mph



#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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E-mail: ramini@olssonassociates.com

\_\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Junction: Off Ramp to I-240 Westbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 4
Free-flow speed on freeway 69.6 mph
Volume on freeway 6290 vph

\_Off Ramp Data\_

 Side of freeway
 Right

 Number of lanes in ramp
 2

 Free-Flow speed on ramp
 45.0
 mph

 Volume on ramp
 1554
 vph

 Length of first accel/decel lane
 500
 ft

 Length of second accel/decel lane
 0
 ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes
Volume on adjacent ramp 611 vph
Position of adjacent ramp Downstream

Type of adjacent ramp On

Distance to adjacent ramp 1200 f

\_Conversion to pc/h Under Base Conditions\_

Junction Components Freeway Ramp Adjacent Ramp 6290 Volume, V (vph) 1554 611 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1709 422 166 Trucks and buses 15 % 8 13 Recreational vehicles 0 0 0 Terrain type: Level Level Level Grade 0.00%0.00%0.00%0.00 mi 0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.962 0.939 0.930 Driver population factor, fP 1.00 1.00 1.00 Flow rate, vp 7110 1799 714 pcph





Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.260

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3180$ 

pc/h

Capacity Checks

 $V_{FI} = V_F$ 

Actual 7110

Maximum 9583

LOS F?

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

5311

9583

No No

 $V_{\text{R}}$ 

1799

4200

(Equation 13-14 or 13-17)

V<sub>3</sub> or V<sub>av34</sub>

1965 pc/h

No

Is  $V_3$  or  $V_{av34} >$ 

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

2700 pc/h?

No

If yes,  $V_{12A} =$ 

3180

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Max Desirable Actual 3180 4400

Violation?

No

Level of Service Determination (if not F)

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 22.6 \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: C

Speed Estimation

Intermediate speed variable,

 $D_S = 0.460$ 

Space mean speed in ramp influence area,  $S_R = 56.9$  mph

Space mean speed in outer lanes,

 $S_0 = 72.6$  mph

Space mean speed for all vehicles,

S = 64.6 mph





#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Junction: Off Ramp to I-240 Westbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 4
Free-flow speed on freeway 69.6 mph
Volume on freeway 6632 vph

\_Off Ramp Data\_

 Side of freeway
 Right

 Number of lanes in ramp
 2

 Free-Flow speed on ramp
 45.0
 mph

 Volume on ramp
 1940
 vph

 Length of first accel/decel lane
 500
 ft

 Length of second accel/decel lane
 0
 ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes
Volume on adjacent ramp 876 vph
Position of adjacent ramp Downstream

Type of adjacent ramp On

Distance to adjacent ramp 1200 f

\_Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp 1940 Volume, V (vph) 6632 876 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1802 527 238 Trucks and buses 15 % 8 13 Recreational vehicles 0 0 0 Terrain type: Level Level Level Grade 0.00%0.00%0.00%0.00 mi 0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.962 0.939 0.930 Driver population factor, fP 1.00 1.00 1.00 Flow rate, vp 7497 2246 1024 pcph





Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.260

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3611$ 

pc/h

Capacity Checks

Actual  $V_{FI} = V_F$ 7497

Maximum 9583

LOS F?

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

5251

9583

No

 $V_{\text{R}}$ 

2246

4200

No

V<sub>3</sub> or V<sub>av34</sub>

1943 pc/h

(Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A} =$ 

3611

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Actual 3611

Max Desirable

4400

Violation? No

Level of Service Determination (if not F)

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 26.3 \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: C

\_Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.500$ 

Space mean speed in ramp influence area,  $S_R = 55.8$  mph

Space mean speed in outer lanes,

 $S_0 = 72.7$  mph

Space mean speed for all vehicles,

S = 63.4mph





#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Oklahoma City, OK 73116 Phone: (405) 242-6642 Fax: (405) 242-6601

E-mail: ramini@olssonassociates.com

Merge	Analysis	

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Junction: On Ramp from I-240 Westbound C-D Road

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

#### Freeway Data\_

Type of analysis Merge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 4736 vph

### \_On Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-flow speed on ramp30.0mphVolume on ramp611vphLength of first accel/decel lane1000ft

#### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes
Volume on adjacent Ramp 1554 vph
Position of adjacent Ramp Upstream
Type of adjacent Ramp Off

Distance to adjacent Ramp 1200

#### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	4736	611	1554	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1287	166	422	v
Trucks and buses	7	15	13	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.930	0.939	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5328	714	1799	pcph





	_Estimation	n of V <sub>12</sub> Merge Areas		
$L_{EQ} =$	903.59	(Equation 13-6 or 13-7)		
$P_{FM} =$	0.605	Using Equation 1		
$V_{12} = V_F (P_{FM}) =$	3226	pc/h		
	Ca	pacity Checks		
	Actual	Maximum LOS F?		
$ m V_{FO}$	6042	7187 No		
$V_3$ or $V_{av34}$	2102	pc/h (Equation 13-14 or 13-17)		
Is $V_3$ or $V_{av34} > 2700 \text{ pc/h}$ ?	No			
Is $V_3$ or $V_{av34} > 1.5 V_{12}/2$ ?	No			
If yes, $V_{12A} = 3226$		(Equation 13-15, 13-16, 13-18, or 13-19)		
	Flow Enter	ing Merge Influence Area		
	Actual	Max Desirable Violation?		
$V_{R12}$	3940	4600 No		
Leve	el of Service	Determination (if not F)		
Density, $D_R = 5.475 + 0.00734$	$V_R + 0.007$	$18 V_{12} - 0.00627 L_A = 29.6 \text{ pc/mi/ln}$		
Level of service for ramp-freev	vay junction	areas of influence D		
	Speed	d Estimation		
Intermediate speed variable,		$M_S = 0.462$		
Space mean speed in ramp infl	uence area,	$S_R = 56.9$ mph		
Space mean speed in outer lane	es,	$S_0 = 63.8 \text{ mph}$		
Space mean speed for all vehic	eles,	S = 59.1 mph		



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Merge	Ana	lveie .

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Junction: On Ramp from I-240 Westbound C-D Road

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

#### Freeway Data\_

Type of analysis Merge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 4692 vph

### \_On Ramp Data\_

Side of freeway Right
Number of lanes in ramp 1
Free-flow speed on ramp 30.0
Volume on ramp 876
Length of first accel/decel lane 1000

Adjacent Ramp Data (if one exists)

vph

mph

vph

ft

Does adjacent ramp exist? Yes

Volume on adjacent Ramp 1940
Position of adjacent Ramp Upstream
Type of adjacent Ramp Off
Distance to adjacent Ramp 1200

### \_Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	4692	876	1940	vph
Peak-hour factor, PHF	0.92	0.92	0.92	•
Peak 15-min volume, V <sub>15</sub>	1275	238	527	v
Trucks and buses	7	15	13	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.930	0.939	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5278	1024	2246	pcph





	Estimation	of V <sub>12</sub> Merge Ar	eas			
$L_{EQ} =$	959.23	(Equation 13-6 or 13-7)				
$P_{FM} =$	0.605	Using Equation	1			
$V_{12} = V_F (P_{FM}) =$	3196	pc/h				
	Ca	pacity Checks				
	Actual	Maximum	LOS F?			
$V_{\mathrm{FO}}$	6302	7187	No			
$V_3$ or $V_{av34}$	2088	pc/h (Eq	nation 13-14 or 13-17)			
Is $V_3$ or $V_{av34} > 2700$ pc/h?	No					
Is $V_3$ or $V_{av34} > 1.5 V_{12}/2$ ?	No					
If yes, $V_{12A} = 3196$		(Eq	uation 13-15, 13-16, 13-18, or 13-1			
	PI P :					
	_Flow Enteri	ing Merge Influer	ce Area			
	_Flow Enteri	ing Merge Influer Max Desirable	-			
V <sub>R12</sub>	=		-			
	Actual 4220	Max Desirable	Violation?			
	Actual 4220 el of Service	Max Desirable 4600  Determination (i	Violation?  No f not F)			
Leve	Actual 4220 el of Service $V_R + 0.007$	Max Desirable 4600  Determination (i $8 V_{12} - 0.00627$	Violation?  No  f not F) $L_A = 31.6 \text{ pc/mi/ln}$			
Density, $D_R = 5.475 + 0.00734$	Actual 4220 el of Service $4 V_R + 0.007$ way junction	Max Desirable 4600  Determination (i $8 V_{12} - 0.00627$	Violation?  No  f not F) $L_A = 31.6 \text{ pc/mi/ln}$			
Density, $D_R = 5.475 + 0.00734$	Actual 4220 el of Service $4 V_R + 0.007$ way junction	Max Desirable 4600  Determination (i $8 V_{12} - 0.00627$ areas of influence	Violation?  No  f not F) $L_A = 31.6 \text{ pc/mi/ln}$ $e D$			
Density, $D_R = 5.475 + 0.00734$ Level of service for ramp-free	Actual 4220 el of Service 4 V <sub>R</sub> + 0.007 way junction Speed	Max Desirable 4600  Determination (i $8 V_{12} - 0.00627$ areas of influence d Estimation $M_S = 0.526$	Violation?  No  f not F) $L_A = 31.6 \text{ pc/mi/ln}$ e D			
Density, $D_R = 5.475 + 0.00734$ Level of service for ramp-free Intermediate speed variable,	Actual 4220 el of Service $V_R + 0.007$ way junctionSpeed luence area,	Max Desirable 4600  Determination (i $8 V_{12} - 0.00627$ areas of influence d Estimation $M_S = 0.526$	Violation?  No  f not F)  L <sub>A</sub> = 31.6 pc/mi/ln e D			



### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Merge	Ana	VS1S

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Junction: On Ramp from I-240 Eastbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

#### Freeway Data

Type of analysis Merge
Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 5347 vph

### \_\_\_On Ramp Data\_

Side of freeway Right Number of lanes in ramp 2

Free-flow speed on ramp 45.0 mph Volume on ramp 1588 vph

#### \_Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes Volume on adjacent Ramp 611 vph

Position of adjacent Ramp Upstream
Type of adjacent Ramp On

Distance to adjacent Ramp 1300 ft

#### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacen	t Ramp
Volume, V (vph)	5347	1579	611	vph
Peak-hour factor, PHF	0.92	0.92	0.92	_
Peak 15-min volume, V <sub>15</sub>	1453	432	166	v
Trucks and buses	8	6	15	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.971	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6044	1778	714	pcph





This ramp is designed as a major merge and according to the Highway Capacity Manual 2010; there are no effective models of performance for a major merge area. Therefore, analysis is limited to checking capacities on the approaching legs and the downstream freeway segment. A merge failure would be indicated by a v/c ratio in excess of 1.00. LOS cannot be determined for major merge areas.

 $\begin{array}{lll} \mbox{Freeway-upstream}, & \mbox{$v/c$} = 6044/7050 = 0.86 \\ \mbox{Ramp} & \mbox{$v/c$} = 1778/4200 = 0.42 \\ \mbox{Freeway-downstream} & \mbox{$v/c$} = 7840/9400 = 0.83 \end{array}$ 

ACCESS JUSTIFICATION REPORT





#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Merge	Ana	VCIC
IVICIAC	/ Mila	LYSIS

Analyst: RA

Agency/Co.: Olsson Associates 5/12/2015 Date performed: Analysis time period: PM Peak Hour I-35 Southbound Freeway/Dir. of Travel:

On Ramp from I-240 Eastbound Junction:

Oklahoma County Jurisdiction:

2040 [PROPOSED DESIGN] Analysis Year:

I-35\_I-240 Interchange Traffic Analysis Description:

#### Freeway Data

Type of analysis Merge Number of lanes in freeway 3

69.6 Free-flow speed on freeway mph Volume on freeway 5568

#### On Ramp Data

Side of freeway Right Number of lanes in ramp 2

Free-flow speed on ramp 45.0 mph Volume on ramp 1652 vph

#### Adjacent Ramp Data (if one exists)

vph

Does adjacent ramp exist? Yes Volume on adjacent Ramp 876

Position of adjacent Ramp Upstream

Type of adjacent Ramp On Distance to adjacent Ramp 1300

Conversion	to pc/n	Under	Base	Conditions	_

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	5568	1652	876	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1513	449	238	V
Trucks and buses	8	6	15	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.971	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6294	1850	1024	pcph





This ramp is designed as a major merge and according to the Highway Capacity Manual 2010; there are no effective models of performance for a major merge area. Therefore, analysis is limited to checking capacities on the approaching legs and the downstream freeway segment. A merge failure would be indicated by a v/c ratio in excess of 1.00. LOS cannot be determined for major merge areas.

Freeway-upstream, v/c = 6294/7050 = 0.89Ramp v/c = 1850/4200 = 0.44Freeway-downstream v/c = 8162/9400 = 0.87

y-downstream v/c = 8102/9400 = 0.87





### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Diverge Analysis

Analyst: RA

Agency/Co.: Olsson Associates Date performed: 5/12/2015 Analysis time period: AM Peak Hour Freeway/Dir. of Travel: I-35 Southbound Off Ramp to SE 89th St. Junction: Jurisdiction: Oklahoma County

2040 [PROPOSED DESIGN] Analysis Year:

Description: I-35 I-240 Interchange Traffic Operation

Freeway Data

Type of analysis Diverge Number of lanes in freeway

Free-flow speed on freeway 69.6 mph Volume on freeway 6935 vph

Off Ramp Data

Side of freeway Right Number of lanes in ramp 1

Free-Flow speed on ramp 45.0 mph Volume on ramp 610 vph Length of first accel/decel lane

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Flow rate, vp

Distance to adjacent ramp

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 6935 610 vph Peak-hour factor, PHF 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1882 166 Trucks and buses % 8 11 Recreational vehicles 0 0 Terrain type: Level Level Grade 0.00%0.00% 0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 Heavy vehicle adjustment, fHV 0.962 0.948 1.00 Driver population factor, fP 1.00 7840 700



pcph



\_Estimation of V12 Diverge Areas\_\_

 $L_{EQ} =$  (Equation 13-12 or 13-13)

 $P_{FD} = 0.436$  Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3813$  pc/h

\_\_\_Capacity Checks\_

 $\begin{array}{cccccc} & & Actual & Maximum & LOS F? \\ V_{FI} = V_F & 7840 & 9583 & No \end{array}$ 

 $V_{FO} = V_F - V_R$  7140 9583 No

 $V_R$  700 2100 No

 $V_3 \ or \ V_{av34} \qquad \qquad 2013 \ pc/h \qquad \qquad \text{(Equation 13-14 or 13-17)}$ 

Is  $V_3$  or  $V_{av34} > 2700 \text{ pc/h}$ ?

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$  No

If yes,  $V_{12A}$  = 3813 (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_Flow Entering Diverge Influence Area\_

Level of Service Determination (if not F)\_\_\_\_\_

Density,  $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 37.0 \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: E

Speed Estimation

Intermediate speed variable,  $D_S = 0.361$ 

Space mean speed in ramp influence area,  $S_R = 59.6$  mph

Space mean speed in outer lanes,  $S_0 = 72.4$  mph

Space mean speed for all vehicles, S = 65.6 mph



#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Diverge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound
Junction: Off Ramp to SE 89<sup>th</sup> St.
Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35 I-240 Interchange Traffic Operation

Freeway Data\_\_\_

Type of analysis Diverge Number of lanes in freeway 4

Free-flow speed on freeway 69.6 mph Volume on freeway 7220 vph

Off Ramp Data\_\_\_\_\_

Side of freeway Right
Number of lanes in ramp
1
Free-Flow speed on ramp
45.0

\_\_\_Adjacent Ramp Data (if one exists)\_\_\_\_\_

Does adjacent ramp exist? No

Volume on adjacent ramp vph

Position of adjacent ramp
Type of adjacent ramp

Distance to adjacent ramp

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 7220 825 vph Peak-hour factor, PHF 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1962 224 Trucks and buses 11 % 8 Recreational vehicles 0 0 Terrain type: Level Level Grade 0.00%0.00% 0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 Heavy vehicle adjustment, fHV 0.962 0.948 1.00 1.00 Driver population factor, fP Flow rate, vp 8162 946 pcph





\_Estimation of V12 Diverge Areas\_\_\_\_

 $L_{EQ} =$  (Equation 13-12 or 13-13)

 $P_{FD} = 0.436$  Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 4092$  pc/h

\_\_Capacity Checks\_

 $\begin{array}{ccccc} & & Actual & Maximum & LOS \ F? \\ V_{FI} = V_F & 8162 & 9583 & No \end{array}$ 

 $V_{FO} = V_F - V_R$  7216 9583 No

V<sub>R</sub> 946 2100 No

 $V_3 \text{ or } V_{av34}$  2035 pc/h (Equation 13-14 or 13-17)

 $\label{eq:second_second} \text{Is} \quad V_3 \text{ or } V_{av34} > \\ \qquad \qquad 2700 \text{ pc/h?} \\ \qquad \qquad \text{No}$ 

Is  $V_3$  or  $V_{av34} > 1.5 \ V_{12}/2$  No

If yes,  $V_{12A}$  = 4092 (Equation 13-15, 13-16, 13-18, or 13-19)

\_Flow Entering Diverge Influence Area\_

Actual Max Desirable Violation?
V<sub>12</sub> 4092 4400 No

Level of Service Determination (if not F)

 $D_{R} = 4.252 + 0.0086 \; V_{12} \text{ - } 0.009 \; L_{D} \; = \; 39.4 \quad pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: E

Speed Estimation

Intermediate speed variable,  $D_S = 0.383$ 

Space mean speed in ramp influence area,  $S_R = 59.0$  mph

Space mean speed in outer lanes,  $S_0 = 72.3$  mph

Space mean speed for all vehicles, S = 65.0 mph

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#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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N/1	erge	Ana	vicio.
10/1	eroe	Ana	IVSIS

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Junction: On Ramp from Santa Fe Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

#### Freeway Data

Type of analysis Merge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 5652 vph

#### On Ramp Data

Side of freeway Right
Number of lanes in ramp 1

Free-flow speed on ramp 45.0 mph Volume on ramp 445.0 vph

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes

Volume on adjacent Ramp 1461 vph
Position of adjacent Ramp Upstream

Type of adjacent Ramp On

Distance to adjacent Ramp 1800

### \_Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacen	t Ramp
Volume, V (vph)	5652	445	1461	vph
Peak-hour factor, PHF	0.92	0.92	0.92	-
Peak 15-min volume, V <sub>15</sub>	1536	121	397	V
Trucks and buses	6	2	2	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.971	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6328	489	1604	pcph





This ramp is designed as a major merge and according to the Highway Capacity Manual 2010; there are no effective models of performance for a major merge area. Therefore, analysis is limited to checking capacities on the approaching legs and the downstream freeway segment. A merge failure would be indicated by a v/c ratio in excess of 1.00. LOS cannot be determined for major merge areas.

 $\begin{array}{ll} \mbox{Freeway-upstream}, & \mbox{$v/c$} = 6328/7050 = 0.90 \\ \mbox{Ramp} & \mbox{$v/c$} = 489/2100 = 0.23 \\ \mbox{Freeway-downstream} & \mbox{$v/c$} = 6817/9400 = 0.73 \\ \end{array}$ 

ACCESS JUSTIFICATION REPORT





### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Merge	Δna	VICIC
IVICIEC	Tilla	LYSIS

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Junction: On Ramp from Santa Fe Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

#### Freeway Data

Type of analysis Merge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 5969 vph

### On Ramp Data\_

Side of freeway Right Number of lanes in ramp 1

Free-flow speed on ramp 45.0 mph Volume on ramp 570 vph

#### \_Adjacent Ramp Data (if one exists)

vph

Does adjacent ramp exist? Yes Volume on adjacent Ramp 1753

Position of adjacent Ramp
Type of adjacent Ramp
On

Type of adjacent Ramp
On

Distance to adjacent Ramp 1800

#### Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5969	570	1753	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1622	155	476	V
Trucks and buses	6	2	2	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.971	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6683	626	1924	pcph





This ramp is designed as a major merge and according to the Highway Capacity Manual 2010; there are no effective models of performance for a major merge area. Therefore, analysis is limited to checking capacities on the approaching legs and the downstream freeway segment. A merge failure would be indicated by a v/c ratio in excess of 1.00. LOS cannot be determined for major merge areas.

Freeway-upstream, v/c = 6683/7050 = 0.95Ramp v/c = 626/2100 = 0.30

Freeway-downstream v/c = 7309/9400 = 0.78





#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Junction: Off Ramp to I-35 Southbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

\_Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 4
Free-flow speed on freeway 69.6 mph
Volume on freeway 6097 vph

\_\_Off Ramp Data\_

Side of freeway Right
Number of lanes in ramp 2
Free-Flow speed on ramp 45.0 mph
Volume on ramp 1588 vph
Length of first accel/decel lane 1160 ft
Length of Second accel/decel lane 0 ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes
Volume on adjacent ramp 1207 vph
Position of adjacent ramp
Downstream

Type of adjacent ramp Off

Distance to adjacent ramp 1250

\_Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp 6097 Volume, V (vph) 1588 1207 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1657 432 328 Trucks and buses 13 % 6 6 Recreational vehicles 0 0 0 Terrain type: Level Level Level Grade 0.00%0.00%0.00%0.00 mi 0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.971 0.971 0.939 Driver population factor, fP 1.00 1.00 1.00 Flow rate, vp 6826 1778 1397 pcph





Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.260

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3090$ 

pc/h

Capacity Checks

 $V_{FI} = V_F$ 

Actual 6826

Maximum 9583

LOS F?

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

5048

9583 4200 No

 $V_{\text{R}}$ 

1778

No

V<sub>3</sub> or V<sub>av34</sub>

1868 pc/h

(Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A} =$ 

3090

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Actual 3090

Max Desirable 4400

Violation?

Level of Service Determination (if not F)

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 9.9 pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: A

Speed Estimation

Intermediate speed variable,

 $D_S = 0.458$ 

Space mean speed in ramp influence area,  $S_R = 57.0$  mph

Space mean speed in outer lanes,

 $S_0 = 73.0$  mph

mph

Space mean speed for all vehicles,

S = 64.7





#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Junction: Off Ramp to I-35 Southbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 4
Free-flow speed on freeway 69.6 mph
Volume on freeway 6539 vph

\_Off Ramp Data\_

 Side of freeway
 Right

 Number of lanes in ramp
 2

 Free-Flow speed on ramp
 45.0
 mph

 Volume on ramp
 1652
 vph

 Length of first accel/decel lane
 1160
 ft

 Length of Second accel/decel lane
 0
 ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent ramp

Position of adjacent ramp

Type of adjacent ramp

Off

Yes

1142

vph

Downstream

Off

Distance to adjacent ramp 1250

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 6539 1652 1142 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1777 449 310 Trucks and buses 6 6 13 % Recreational vehicles 0 0 0 % Terrain type: Level Level Level Grade 0.00%0.00%0.00%0.00 mi 0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.971 0.971 0.939 Driver population factor, fP 1.00 1.00 1.00 Flow rate, vp 7321 1850 1322 pcph





Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.260

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3272$ 

pc/h

Capacity Checks

 $V_{FI} = V_F$ 

Actual 7321

Maximum 9583

LOS F?

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

5471

9583

No

 $V_{\text{R}}$ 

1850

4200

No

V<sub>3</sub> or V<sub>av34</sub>

2024 pc/h

(Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A} =$ 

3272

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Actual 3272

Max Desirable 4400

Violation?

Level of Service Determination (if not F)

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 11.5 pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: B

\_Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.465$ 

Space mean speed in ramp influence area,  $S_R = 56.8$  mph

Space mean speed in outer lanes,

 $S_0 = 72.4$  mph

Space mean speed for all vehicles,

S = 64.5 mph





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Diverge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Junction: Off Ramp to I-35 Northbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35 I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 4509 vph

\_\_\_\_Off Ramp Data

Side of freeway Right Number of lanes in ramp 1

Free-Flow speed on ramp
Volume on ramp
Length of first accel/decel lane

1207
Thinher of hards in lamp
1207
Thinher of hards i

\_Adjacent Ramp Data (if one exists)\_

Does adjacent ramp exist? Yes
Volume on adjacent ramp 1588 vph

Position of adjacent ramp Upstream Type of adjacent ramp Off

Distance to adjacent ramp 1250

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp 4509 Volume, V (vph) 1207 1588 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1225 328 432 Trucks and buses 13 % 6 6 Recreational vehicles 0 0 Terrain type: Level Level Level Grade 0.00%0.00%0.00%0.00 mi 0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.971 0.939 0.971

1.00

5048

1.00

1397



Driver population factor, fP

Flow rate, vp



pcph

1.00

1778



Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

2701.32

(Equation 13-12 or 13-13)

 $P_{\text{FD}} =$ 

0.570

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3476$ 

pc/h

Capacity Checks\_

 $V_{FI} = V_F$ 

Actual 5048

Maximum 7187

2000

LOS F? No

 $V_{FO} = V_F - V_R$ 

3651

7187

No

1397

No

 $V_3$  or  $V_{av34}$ 

1572 pc/h

(Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A}$ =

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

3476

 $V_{12}$ 

Actual 3476

Max Desirable

Violation? No

Level of Service Determination (if not F)\_

Density,

 $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 22.9 pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: C

\_Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.619$ 

Space mean speed in ramp influence area,  $S_R = 52.5$  mph

Space mean speed in outer lanes,

 $S_0 = 74.1$  mph

Space mean speed for all vehicles,

S = 57.8mph





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Diverge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Junction: Off Ramp to I-35 Northbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35 I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 4887 vph

\_\_\_\_Off Ramp Data\_

Side of freeway Right Number of lanes in ramp 1

Free-Flow speed on ramp 30.0 mph
Volume on ramp 1142 vph
Length of first accel/decel lane 1250 ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? Yes Volume on adjacent ramp 1652 vph

Position of adjacent ramp Upstream Type of adjacent ramp Off

Distance to adjacent ramp 1250

Conversion to pc/h Under Base Conditions\_\_\_\_

Junction Components Freeway Ramp Adjacent Ramp 4887 Volume, V (vph) 1142 1652 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1328 310 449 Trucks and buses % 6 13 6 Recreational vehicles 0 0 Terrain type: Level Level Level Grade 0.00%0.00%0.00%0.00 mi0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.971 0.939 0.971 Driver population factor, fP 1.00 1.00 1.00

5471

1322



pcph

1850

Flow rate, vp



Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

2701.32

(Equation 13-12 or 13-13)

 $P_{\text{FD}} =$ 

0.562

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3655$ 

pc/h

Capacity Checks\_

 $V_{FI} = V_F$ 

Actual 5471

Maximum 7187

LOS F? No

 $V_{FO} = V_F - V_R$ 

4149

7187

2000

No

1322

 $V_3$  or  $V_{av34}$ 

1816 pc/h

No (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A}$ =

3655

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

 $V_{12}$ 

Actual 3655

Max Desirable

Violation? No

Level of Service Determination (if not F)\_

Density,

 $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 24.4 pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: C

\_Speed Estimation\_

Intermediate speed variable,

 $D_S = 0.612$ 

Space mean speed in ramp influence area,  $S_R = 52.7$  mph

Space mean speed in outer lanes,

 $S_0 = 73.2$  mph

Space mean speed for all vehicles,

S = 58.1 mph





#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Junction: On Ramp from I-35 Northbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

\_\_\_Freeway Data\_

Type of analysis Merge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 3302 vph

\_On Ramp Data\_

Side of freeway Right Number of lanes in ramp 2 45.0 Free-flow speed on ramp mph Volume on ramp 1176 vph Length of first accel/decel lane 1500 ft Length of Second accel/decel lane 500 ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent Ramp

Position of adjacent Ramp

Type of adjacent Ramp

Distance to adjacent Ramp

Off

Distance to adjacent Ramp

Distance to adjacent Ramp

Distance to adjacent Ramp

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp 3302 Volume, V (vph) 1176 1207 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 897 320 328 Trucks and buses 13 4 20 % Recreational vehicles 0 0 0 % Terrain type: Level Level Level Grade Length mi mi mi Trucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.980 0.909 0.939 Driver population factor, fP 1.00 1.00 1.00 Flow rate, vp 3661 1406 1397 pcph





Estimation of V<sub>12</sub> Merge Areas\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 0.555$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 2032$  pc/h

Capacity Checks\_

Actual Maximum LOS F?

V<sub>FO</sub> 5067 7187 No

 $V_3 \text{ or } V_{av34}$  1629 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700$  pc/h? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? Yes

Intermediate speed variable,

If yes,  $V_{12A} = 2092$  (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

Actual Max Desirable Violation?

 $M_S = 0.135$ 

 $V_{R12}$  3498 4600 No

Level of Service Determination (if not F)

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} - 0.00627 \ L_A = 10.2 \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence B

Speed Estimation\_

-

Space mean speed in ramp influence area,  $S_R = 65.9$  mph

Space mean speed in outer lanes,  $S_0 = 65.8$  mph

Space mean speed for all vehicles, S = 65.8 mph





#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Junction: On Ramp from I-35 Northbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

\_\_Freeway Data\_

Type of analysis Merge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 3745 vph

#### \_On Ramp Data\_

Side of freeway Right Number of lanes in ramp 2 45.0 Free-flow speed on ramp mph Volume on ramp 880 vph Length of first accel/decel lane 1500 ft Length of Second accel/decel lane 500 ft

#### Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent Ramp
Position of adjacent Ramp
Type of adjacent Ramp
Distance to adjacent Ramp
Off
Distance to adjacent Ramp
940
ft

#### \_Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent I	Ramp
Volume, V (vph)	3745	880	1142	vph
Peak-hour factor, PHF	0.92	0.92	0.92	_
Peak 15-min volume, V <sub>15</sub>	1018	239	310	v
Trucks and buses	4	20	13	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.980	0.909	0.939	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4152	1052	1322	pcph





Estimation of V<sub>12</sub> Merge Areas\_

 $L_{EQ} =$  (Equation 13-6 or 13-7)

 $P_{FM} = 0.555$  Using Equation 1

 $V_{12} = V_F (P_{FM}) = 2304$  pc/h

Capacity Checks\_

Actual Maximum LOS F?

V<sub>FO</sub> 5204 7187 No

V<sub>3</sub> or V<sub>av34</sub> 1848 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700$  pc/h? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ ? Yes

If yes,  $V_{12A} = 2372$  (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

Actual Max Desirable Violation?

V<sub>R12</sub> 3424 4600 No

Level of Service Determination (if not F)

Density,  $D_R = 5.475 + 0.00734 \ V_R + 0.0078 \ V_{12} \ \ \text{--} \ 0.00627 \ L_A \ \ = \ 9.8 \ \ \ pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence A

Speed Estimation\_

 $Intermediate \ speed \ variable, \qquad \qquad M_S = 0.126$ 

Space mean speed in ramp influence area,  $S_R = 66.1$  mph

Space mean speed in outer lanes,  $S_0 = 65.0$  mph

Space mean speed for all vehicles, S = 65.7 mph



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Diverge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Junction: Off Ramp to Eastern Ave.
Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 4478 vph

\_\_\_Off Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp558vphLength of first accel/decel lane1500ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Distance to adjacent ramp

Conversion to pc/h Under Base Conditions\_

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 4478 558 vph Peak-hour factor, PHF 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1217 152 Trucks and buses % 4 Recreational vehicles 0 0 Terrain type: Level Level Grade 0.00%0.00% 0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 Heavy vehicle adjustment, fHV 0.966 0.980 1.00 1.00 Driver population factor, fP Flow rate, vp 5038 619 pcph





\_Estimation of V12 Diverge Areas\_\_\_\_\_

 $L_{EQ} =$  (Equation 13-12 or 13-13)

 $P_{FD} = 0.606$  Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3295$  pc/h

\_Capacity Checks\_

 $V_{FO} = V_F - V_R$  4419 7187 No

 $V_R$  619 2100 No

 $V_3 \ or \ V_{av34} \qquad \qquad 1743 \ pc/h \qquad \qquad \text{(Equation 13-14 or 13-17)}$ 

Is  $V_3$  or  $V_{av34} > 2700 \text{ pc/h}$ ?

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$  No

If yes,  $V_{12A}$  = 3295 (Equation 13-15, 13-16, 13-18, or 13-19)

\_Flow Entering Diverge Influence Area\_

Actual Max Desirable Violation?
V<sub>12</sub> 3295 4400 No

Level of Service Determination (if not F)\_\_\_\_\_

 $D_{R} = 4.252 + 0.0086 \ V_{12} \text{ - } 0.009 \ L_{D} \ = \ 19.1 \quad \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: B

\_\_\_\_Speed Estimation\_

Intermediate speed variable,  $D_S = 0.354$ 

Space mean speed in ramp influence area,  $S_R = 59.8$  mph

Space mean speed in outer lanes,  $S_0 = 73.5$  mph

Space mean speed for all vehicles, S = 63.9 mph



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Diverge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound
Junction: Off Ramp to Easte

Junction: Off Ramp to Eastern Ave.
Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

Freeway Data\_

Type of analysis Diverge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 4626 vph

\_\_Off Ramp Data\_\_

Side of freeway Right
Number of lanes in ramp
1
Free-Flow speed on ramp 45.0

\_Adjacent Ramp Data (if one exists)\_\_\_

Does adjacent ramp exist?

Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp

Distance to adjacent ramp

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 4626 648 vph Peak-hour factor, PHF 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1257 176 Trucks and buses % 7 4 Recreational vehicles 0 0 Terrain type: Level Level Grade 0.00%0.00% 0.00 mi Length 0.00 mi Trucks and buses PCE, ET 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 Heavy vehicle adjustment, fHV 0.966 0.980 Driver population factor, fP 1.00 1.00 Flow rate, vp 5203 718 pcph





\_Estimation of V12 Diverge Areas\_\_\_\_\_

 $L_{EQ} =$  (Equation 13-12 or 13-13)

 $P_{FD} = 0.597$  Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3395$  pc/h

\_Capacity Checks\_

 $\begin{array}{ccccc} & & Actual & Maximum & LOS F? \\ V_{FI} = V_F & & 5203 & 7187 & & No \end{array}$ 

 $V_{FO} = V_F - V_R$  4485 7187 No

V<sub>R</sub> 718 2100 No

 $V_3$  or  $V_{av34}$  1808 pc/h (Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} > 2700 \text{ pc/h}$ ?

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$  No

If yes,  $V_{12A}$  = 3395 (Equation 13-15, 13-16, 13-18, or 13-19)

\_Flow Entering Diverge Influence Area\_

Actual Max Desirable Violation?
V<sub>12</sub> 3395 4400 No

Level of Service Determination (if not F)\_\_\_\_\_

Density,  $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 19.9 \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: B

Speed Estimation

Intermediate speed variable,  $D_S = 0.363$ 

Space mean speed in ramp influence area,  $S_R = 59.6$  mph

Space mean speed in outer lanes,  $S_0 = 73.2$  mph

Space mean speed for all vehicles, S = 63.7 mph

ACCESS JUSTIFICATION REPORT





#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Reza Amini, PE Olsson Associates

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\_\_\_\_\_Merge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: On Ramp from Eastern Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

\_Freeway Data\_

Type of analysis Merge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 2820 vph

\_\_\_On Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-flow speed on ramp45.0mphVolume on ramp645vphLength of first accel/decel lane1500ft

\_\_\_\_\_Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? No

Volume on adjacent Ramp
Position of adjacent Ramp

Type of adjacent Ramp
Distance to adjacent Ramp
ft

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp Volume, V (vph) 2820 645 vph Peak-hour factor, PHF 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 766 175 Trucks and buses 4 % Recreational vehicles 0 0 % Terrain type: Level Level Grade % % Length mi mi Trucks and buses PCE, ET 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 Heavy vehicle adjustment, fHV 0.966 0.980 Driver population factor, fP 1.00 1.00 Flow rate, vp 3172 715 pcph





$L_{EQ} =$	1451.57	(Equation 13-6 or 13-7)			
$P_{FM} =$	0.619	Using Equation 1			
$V_{12} = V_F (P_{FM}) =$	1965	pc/h			
	Ca <sub>]</sub>	pacity Checks			
	Actual	Maximum LOS F?			
$V_{FO}$	3887	7187 No			
$V_3$ or $V_{av34}$	1207	pc/h (Equation 13-14 or 13-17)			
Is $V_3$ or $V_{av34} > 2700$ pc/h?	No				
Is $V_3$ or $V_{av34} > 1.5 V_{12}/2$ ?	No				
If yes, $V_{12A} = 1965$		(Equation 13-15, 13-16, 13-18, or 13-19)			
	Flow Enteri	ing Merge Influence Area			
	Actual	Max Desirable Violation?			
$V_{R12}$	3887	4600 No			
Level of Service Determination (if not F)					
Density, $D_R = 5.475 + 0.00734 V_R + 0.0078 V_{12} - 0.00627 L_A = 16.6 pc/mi/ln$					

\_Speed Estimation\_

 $M_S = 0.243$ 

 $S_0 = 67.1$  mph

S = 64.1 mph

Estimation of V<sub>12</sub> Merge Areas\_

Level of service for ramp-freeway junction areas of influence B

Space mean speed in ramp influence area,  $S_R = 62.9$  mph

Intermediate speed variable,

Space mean speed in outer lanes,

Space mean speed for all vehicles,



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E-mail: ramini@olssonassociates.com

Merge Analysis\_

Analyst:

Agency/Co.: Olsson Associates Date performed: 5/12/2015 PM Peak Hour Analysis time period: Freeway/Dir. of Travel: I-240 Westbound

Junction: On Ramp from Eastern Ave.

Jurisdiction: Oklahoma County

2040 [PROPOSED DESIGN] Analysis Year:

I-35/I-240 Interchange Traffic Analysis Description:

Freeway Data

Type of analysis Merge Number of lanes in freeway 3

Free-flow speed on freeway 69.6 mph Volume on freeway 3348 vph

On Ramp Data\_

Side of freeway Right Number of lanes in ramp

45.0 Free-flow speed on ramp mph Volume on ramp 733 vph Length of first accel/decel lane 1500

Adjacent Ramp Data (if one exists)

ft

Does adjacent ramp exist? No

Volume on adjacent Ramp vph Position of adjacent Ramp

Type of adjacent Ramp Distance to adjacent Ramp

Conversion to pc/h Under Base Conditions

Junction Components Adjacent Ramp Freeway Ramp Volume, V (vph) 3348 733 vph Peak-hour factor, PHF 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 199 910 Trucks and buses 4 % Recreational vehicles 0 0 Terrain type: Level Level Grade % % Length mi mi Trucks and buses PCE, ET 1.5 1.5 1.2 Recreational vehicle PCE, ER 1.2 Heavy vehicle adjustment, fHV 0.966 0.980 Driver population factor, fP 1.00 1.00 Flow rate, vp 3766 813 pcph





	_Estimation	n of V <sub>12</sub> Merge Areas		
$L_{EQ} =$	1451.57	(Equation 13-6 or 13-7)		
$P_{FM} =$	0.619	Using Equation 1		
$V_{12} = V_F (P_{FM}) =$	2333	pc/h		
	Ca	pacity Checks		
	Actual	Maximum LOS F?		
$V_{FO}$	4579	7187 No		
$V_3$ or $V_{av34}$	1433	pc/h (Equation 13-14 or 13-17)		
Is $V_3$ or $V_{av34} > 2700$ pc/h?	No			
Is $V_3$ or $V_{av34} > 1.5 V_{12}/2$ ?	No			
If yes, $V_{12A} = 2333$		(Equation 13-15, 13-16, 13-18, or 13-19)		
	Flow Enteri	ng Merge Influence Area		
	Actual	Max Desirable Violation?		
$V_{R12}$	4579	4600 No		
Leve	el of Service	Determination (if not F)		
Density, $D_R = 5.475 + 0.00734$	$V_R + 0.0078$	$8 V_{12} - 0.00627 L_A = 20.2 \text{ pc/mi/ln}$		
Level of service for ramp-freev	vay junction	areas of influence C		
Speed Estimation				
Intermediate speed variable,		$M_S = 0.277$		
Space mean speed in ramp infl	uence area,	$S_R = 62.0$ mph		
Space mean speed in outer land	es,	$S_O = 66.2$ mph		
Space mean speed for all vehic	les,	S = 63.2 mph		

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\_\_\_\_\_Diverge Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: Off Ramp to I-240 Westbound C-D Rd.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

\_Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 3465 vph

\_\_Off Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp1444vphLength of first accel/decel lane1500ft

\_\_Adjacent Ramp Data (if one exists)\_\_\_\_\_

Does adjacent ramp exist? No

Volume on adjacent ramp vph

Position of adjacent ramp
Type of adjacent ramp
Distance to adjacent ramp
ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	3465	1444	vph
Peak-hour factor, PHF	0.92	0.92	1
Peak 15-min volume, V <sub>15</sub>	942	392	v
Trucks and buses	7	10	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00%	0.00%	
Length	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3898	1648	pcph





Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.587

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 2968$ 

pc/h

Capacity Checks

 $V_{FI} = V_F$ 

Actual 3898

Maximum 7187

LOS F?

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

2250

7187

No

 $V_{\text{R}}$ 

1648

2100

No

V<sub>3</sub> or V<sub>av34</sub>

930 pc/h

(Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A} =$ 

2968

(Equation 13-15, 13-16, 13-18, or 13-19)

2968

Flow Entering Diverge Influence Area

Actual Max Desirable 4400

Violation?

Level of Service Determination (if not F)

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 16.3 pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: B

Speed Estimation

Intermediate speed variable,

 $D_S = 0.446$ 

Space mean speed in ramp influence area,  $S_R = 57.3$  mph

Space mean speed in outer lanes,

 $S_0 = 76.4$  mph

mph

Space mean speed for all vehicles,

S = 60.9





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\_\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: Off Ramp to I-240 Westbound C-D Rd.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

\_Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 4081 vph

\_\_\_Off Ramp Data

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp1549vphLength of first accel/decel lane1500ft

Adjacent Ramp Data (if one exists)\_\_\_\_\_

Does adjacent ramp exist? No

Volume on adjacent ramp
Position of adjacent ramp

Type of adjacent ramp
Distance to adjacent ramp

ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	4081	1549	vph
Peak-hour factor, PHF	0.92	0.92	•
Peak 15-min volume, V <sub>15</sub>	1109	421	v
Trucks and buses	7	10	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00%	0.00%	
Length	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4591	1768	pcph





Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.564

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3360$ 

pc/h

Capacity Checks

 $V_{FI} = V_F$ 

Actual 4591

Maximum 7187

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

2823

7187

No

LOS F?

 $V_{\text{R}}$ 

1768

2100

No

V<sub>3</sub> or V<sub>av34</sub>

1231 pc/h

(Equation 13-14 or 13-17)

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A} =$ 

3360

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Actual 3360

Max Desirable 4400

Violation?

Level of Service Determination (if not F)

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 19.6 pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: B

Speed Estimation

Intermediate speed variable,

 $D_S = 0.457$ 

Space mean speed in ramp influence area,  $S_R = 57.0$  mph

Space mean speed in outer lanes,

 $S_0 = 75.5$  mph

Space mean speed for all vehicles,

S = 61.0 mph





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\_\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: Off Ramp from I-240 Westbound C-D Rd. to I-35 Southbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

\_Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 2
Free-flow speed on freeway 55.0 mph
Volume on freeway 831 vph

\_Off Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp30.0mphVolume on ramp611vphLength of first accel/decel lane0ft

Adjacent Ramp Data (if one exists)

vph

Does adjacent ramp exist? Yes
Volume on adjacent ramp
Position of adjacent ramp
Upstream

Type of adjacent ramp Off

Distance to adjacent ramp 1100 ft

Conversion to pc/h Under Base Conditions

Freeway Junction Components Ramp Adjacent Ramp Volume, V (vph) 831 611 613 vph Peak-hour factor, PHF 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 226 166 167 Trucks and buses 11 15 14 % Recreational vehicles 0 0 0 % Terrain type: Level Level Level Grade 0.00% 0.00% 0.00% Length 0.00 mi0.00 mi0.00 miTrucks and buses PCE, ET 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.948 0.930 0.935 Driver population factor, fP 1.00 1.00 1.00 Flow rate, vp 953 714 713 pcph





\_\_\_\_Estimation of V12 Diverge Areas\_\_\_\_\_

 $L_{EQ} =$  (Equation 13-12 or 13-13)

 $P_{FD} = 1.000$  Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 953$  pc/h

Capacity Checks

 $V_{FO} = V_F - V_R$  239 7187 No

 $V_R$  714 2000 No

 $V_{3} \ or \ V_{av34} \qquad \qquad 0 \qquad \qquad pc/h \qquad \text{(Equation 13-14 or 13-17)}$ 

Is  $V_3$  or  $V_{av34}$  > 2700 pc/h? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$  No

If yes,  $V_{12A}$  = 953 (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_Flow Entering Diverge Influence Area\_\_

Level of Service Determination (if not F)\_\_\_\_\_

Density,  $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 12.4 \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: B

\_\_\_\_Speed Estimation\_

Intermediate speed variable,  $D_S = 0.557$ 

Space mean speed in ramp influence area,  $S_R = 47.8$  mph

Space mean speed in outer lanes,  $S_0 = N/A$  mph

Space mean speed for all vehicles, S = 47.8 mph

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Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: Off Ramp from I-240 Westbound C-D Rd. to I-35 Southbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

\_Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 2
Free-flow speed on freeway 55.0 mph
Volume on freeway 1178 vph

\_Off Ramp Data\_

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp30.0mphVolume on ramp876vphLength of first accel/decel lane0ft

\_Adjacent Ramp Data (if one exists)

vph

Does adjacent ramp exist? Yes Volume on adjacent ramp 371

Position of adjacent ramp Upstream Type of adjacent ramp Off

Distance to adjacent ramp 1100 ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent	Ramp
Volume, V (vph)	1178	876	371	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	320	238	101	v
Trucks and buses	11	15	14	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00%	0.00%	0.00%	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.948	0.930	0.935	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1351	1024	431	peph





Estimation of V12 Diverge Areas\_\_\_\_\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

No

 $P_{FD} =$ 

 $V_{12}$ 

1.000

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 1351$ 

pc/h

Capacity Checks\_

 $V_{FO} = V_F - V_R$  327 7187

 $V_R$  1024 2000 No

 $V_3 \ or \ V_{av34} \qquad \qquad 0 \qquad \qquad pc/h \qquad \text{(Equation 13-14 or 13-17)}$ 

Is  $V_3$  or  $V_{av34}$  > 2700 pc/h? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$  No

If yes,  $V_{12A}$  = 1351 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Actual 1351 Max Desirable

Violation? No

4400

Level of Service Determination (if not F)

Density,  $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 15.9 \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: B

\_\_\_\_Speed Estimation\_

Intermediate speed variable,  $D_S = 0.585$ 

Space mean speed in ramp influence area,  $S_R = 47.4$  mph

Space mean speed in outer lanes,  $S_0 = N/A$  mph

Space mean speed for all vehicles, S = 47.4 mph



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Merge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: On Ramp from both I-35 South & Northbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

Freeway Data\_\_\_

Type of analysis Merge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 2021 vph

#### \_On Ramp Data\_

Side of freeway Right Number of lanes in ramp 2 Free-flow speed on ramp 45.0 mph Volume on ramp 2859 vph Length of first accel/decel lane 500 ft Length of Second accel/decel lane 1500 ft

\_\_\_\_\_Adjacent Ramp Data (if one exists)

Does adjacent ramp exist? No

Volume on adjacent Ramp vph Position of adjacent Ramp

Type of adjacent Ramp
Distance to adjacent Ramp ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	2021	2859	vph
Peak-hour factor, PHF	0.92	0.92	•
Peak 15-min volume, V <sub>15</sub>	549	777	V
Trucks and buses	5	8	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	%	%	
Length	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.976	0.962	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2252	3232	pcph





Estimation of V <sub>12</sub> Merge Areas				
$L_{EQ} = 1451.57$ (Equation 13-6 or 13-7)				
$P_{FM} =$	0.555	Using Equation 1		
$V_{12} = V_F (P_{FM}) =$	1250	pc/h		
	Ca <sub>l</sub>	pacity Checks		
	Actual	Maximum LOS F?		
$ m V_{FO}$	5484	7187 No		
$V_3$ or $V_{av34}$	1002	pc/h (Equation 13-14 or 13-17)		
Is $V_3$ or $V_{av34} > 2700$ pc/h?	No			
Is $V_3$ or $V_{av34} > 1.5 V_{12}/2$ ?	Yes			
If yes, $V_{12A} = 1286$		(Equation 13-15, 13-16, 13-18, or 13-19)		
	Flow Enteri	ng Merge Influence Area		
Actual Max Desirable Violation?				
$V_{R12}$	4518	4600 No		
Leve	of Service	Determination (if not F)		
Density, $D_R = 5.475 + 0.00734$	$V_R + 0.0078$	$8 V_{12} - 0.00627 L_A = 23.6 \text{ pc/mi/ln}$		
Level of service for ramp-freew	ay junction	areas of influence C		
Speed Estimation				
	Intermediate speed variable, $M_S = 0.453$			
Intermediate speed variable,		$M_S = 0.453$		
Intermediate speed variable,  Space mean speed in ramp influ	nence area,			





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Merge Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Junction: On Ramp from both I-35 South & Northbound

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Analysis

Freeway Data

Type of analysis Merge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 2532 vph

#### \_On Ramp Data\_

Side of freeway Right Number of lanes in ramp 2 Free-flow speed on ramp 45.0 mph Volume on ramp 3202 vph Length of first accel/decel lane 500 ft Length of Second accel/decel lane 1500 ft

\_\_\_\_\_Adjacent Ramp Data (if one exists) \_\_\_\_\_

Does adjacent ramp exist? No

Volume on adjacent Ramp vph Position of adjacent Ramp

Type of adjacent Ramp
Distance to adjacent Ramp ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	2532	3202	vph
Peak-hour factor, PHF	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	688	870	V
Trucks and buses	5	8	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	%	%	
Length	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.976	0.962	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2821	3620	pcph





	_Estimation	of V <sub>12</sub> Merge Areas		
$L_{EQ} =$	1451.57	(Equation 13-6 or 13-7)		
$P_{FM} =$	0.555	Using Equation 1		
$\mathbf{V}_{12} = \mathbf{V}_{\mathrm{F}} \left( \mathbf{P}_{\mathrm{FM}} \right) =$	1566	pc/h		
	Ca	pacity Checks		
	Actual	Maximum LOS F?		
$ m V_{FO}$	6441	7187 No		
$V_3$ or $V_{av34}$	1255	pc/h (Equation 13-14 or 13-17)		
Is $V_3$ or $V_{av34} > 2700$ pc/h?	No			
Is $V_3$ or $V_{av34} > 1.5 V_{12}/2$ ?	Yes			
If yes, $V_{12A} = 1612$		(Equation 13-15, 13-16, 13-18, or 13-19)		
	Flow Enteri	ng Merge Influence Area		
	Actual	Max Desirable Violation?		
$V_{R12}$	5232	4600 Yes		
Leve	l of Service	Determination (if not F)		
Density, $D_R = 5.475 + 0.00734$	$V_R + 0.0078$	$8 V_{12} - 0.00627 L_A = 28.9 \text{ pc/mi/ln}$		
Level of service for ramp-freew	vay junction	areas of influence D		
	Speed	1 Estimation		
Intermediate speed variable,	Intermediate speed variable, $M_S = 0.826$			
Space mean speed in ramp influ	uence area,	$S_R = 46.8 \text{ mph}$		
Space mean speed in outer lane	es,	$S_O = 67.0$ mph		
Space mean speed for all vehicles, $S = 49.6$ mph				





#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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Diverge Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates Date performed: 5/12/2015 Analysis time period: AM Peak Hour Freeway/Dir. of Travel: I-240 Westbound Junction: Off Ramp to Santa Fe Ave.

Jurisdiction: Oklahoma County

2040 [PROPOSED DESIGN] Analysis Year:

I-35\_I-240 Interchange Traffic Operation Description:

Freeway Data

Diverge Type of analysis Number of lanes in freeway 3 Free-flow speed on freeway 69.6 mph Volume on freeway 4880 vph

Off Ramp Data

Side of freeway Right Number of lanes in ramp 1 45.0 Free-Flow speed on ramp mph Volume on ramp 245 vph Length of first accel/decel lane 1500

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?

No Volume on adjacent ramp vph

Position of adjacent ramp Type of adjacent ramp ft Distance to adjacent ramp

Conversion to pc/h Under Base Conditions

Junction Components Freeway Ramp Adjacent Ramp 4880 Volume, V (vph) 245 vph Peak-hour factor, PHF 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 1326 67 Trucks and buses 6 2 % Recreational vehicles 0 0 % Terrain type: Level Level Grade 0.00% 0.00% Length 0.00 mi0.00 mi Trucks and buses PCE, ET 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 Heavy vehicle adjustment, fHV 0.971 0.990 Driver population factor, fP 1.00 1.00 Flow rate, vp 5463 269 pcph





Estimation of V12 Diverge Areas\_\_\_\_\_

 $L_{EQ} =$  (Equation 13-12 or 13-13)

 $P_{FD} = 0.611$  Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3443$  pc/h

Capacity Checks\_

 $V_{FO} = V_F - V_R$  5194 7187 No

 $V_R$  269 2100 No

 $V_3 \ or \ V_{av34} \qquad \qquad 2020 \quad pc/h \qquad \qquad \text{(Equation 13-14 or 13-17)}$ 

Is  $V_3$  or  $V_{av34}$  > 2700 pc/h? No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

If yes,  $V_{12A}$  = 3443 (Equation 13-15, 13-16, 13-18, or 13-19)

\_\_\_\_\_Flow Entering Diverge Influence Area\_

Actual Max Desirable Violation?

Level of Service Determination (if not F)

Density,  $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 20.4 \text{ pc/mi/ln}$ 

Level of service for ramp-freeway junction areas of influence: C

\_\_\_Speed Estimation\_

 $D_S = 0.322$  Intermediate speed variable,

 $V_{12}$ 

Space mean speed in ramp influence area,  $S_R = 60.7$  mph

Space mean speed in outer lanes,  $S_0 = 72.4$  mph

Space mean speed for all vehicles, S = 64.6 mph



#### HCS 2010: Freeway Merge and Diverge Segments Release 6.1

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\_\_\_\_\_Diverge Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date performed: 5/12/2015
Analysis time period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound
Junction: Off Ramp to Santa Fe Ave.

Jurisdiction: Oklahoma County

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

\_Freeway Data\_

Type of analysis Diverge
Number of lanes in freeway 3
Free-flow speed on freeway 69.6 mph
Volume on freeway 5734 vph

\_\_\_Off Ramp Data

Side of freewayRightNumber of lanes in ramp1Free-Flow speed on ramp45.0mphVolume on ramp350vphLength of first accel/decel lane1500ft

\_Adjacent Ramp Data (if one exists)\_\_\_\_\_

Does adjacent ramp exist? No

Volume on adjacent ramp vph

Position of adjacent ramp
Type of adjacent ramp
Distance to adjacent ramp
ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	5734	350	vph
Peak-hour factor, PHF	0.92	0.92	•
Peak 15-min volume, V <sub>15</sub>	1558	95	v
Trucks and buses	6	2	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00%	0.00%	
Length	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6420	384	pcph





Estimation of V12 Diverge Areas\_

 $L_{EQ} =$ 

(Equation 13-12 or 13-13)

 $P_{FD} =$ 

0.582

Using Equation 5

 $V_{12} = V_R + (V_F - V_R) P_{FD} = 3896$ 

pc/h

Capacity Checks

 $V_{FI} = V_F$ 

Actual Maximum 6420 7187

7187

LOS F?

 $V_{\text{FO}} = V_{\text{F}}$  -  $V_{\text{R}}$ 

6036

No

 $V_{\text{R}}$ 

384

2100

(Equation 13-14 or 13-17)

V<sub>3</sub> or V<sub>av34</sub>

2524 pc/h

Is  $V_3$  or  $V_{av34} >$ 

2700 pc/h?

No

No

Is  $V_3$  or  $V_{av34} > 1.5 V_{12}/2$ 

No

If yes,  $V_{12A} =$ 

3896

(Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

Max Desirable Actual 3896 4400

Violation?

Level of Service Determination (if not F)

Density,

 $V_{12}$ 

 $D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D = 24.3 pc/mi/ln$ 

Level of service for ramp-freeway junction areas of influence: C

Speed Estimation

Intermediate speed variable,

 $D_S = 0.333$ 

Space mean speed in ramp influence area,  $S_R = 60.4$  mph

Space mean speed in outer lanes,

 $S_0 = 70.4$  mph

Space mean speed for all vehicles,

S = 64.0mph







### APPENDIX C

### **HCS Basic Freeway Weaving Segments**

		Page
C-1	EXISTING CONDITIONS, Utilizing 2013 Traffic Data	315
C-2	EXISTING CONDITIONS, Utilizing 2040 Traffic Data	379
C-3	PROPOSED DESIGN, Utilizing 2040 Traffic Data	443





#### HCS 2010: Freeway Weaving Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Weaving Location: Between On Ramp from 89th street to Off Ramp to Northbound I-35 C-D Rd.

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35 I-240 Interchange Traffic Operation

Inputs\_

Segment Type Freeway Weaving configuration Number of lanes, N One-Sided 4 Weaving segment length,  $L_{\scriptscriptstyle \rm S}$ 2150 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level % Grade 0.00 Length 0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components

	$ m V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	4087	500	2003	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1111	136	544	0	
Trucks and buses	8	9	10	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.957	0.952	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4620	568	2286	0	pc/h
Volume ratio, VR	0.382				-

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>W</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>	832	
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





Weaving and Non-Weaving Speeds							
Weaving intensity factor, W							
Average weaving speed, S <sub>W</sub>			mi/h				
Average non-weaving speed, S <sub>NW</sub>			mi/h				
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity			
Weaving segment speed, S			mi/h				
Weaving segment density, D	)		pc/mi/ln				
Level of service, LOS		F	-				
Weaving segment v/c ratio		1.189					
Weaving segment flow rate,	$\mathbf{v}$	7474	pc/h				
Weaving segment capacity,	$C_{W}$	6043	veh/h				
	Limitations	on Weaving	Segments				
If limit reached, see note.	-	S	٠				
	Min	Max	Actual	Note			
Weaving length (ft)	300	6478	2150	a, b			
		Max	Analyzed				
Density-based capacity,		2350	1192	c			
C <sub>IWL</sub> (pc/h/ln)							
		Max	Analyzed				
v/c ratio		1.00	1.189	d			
Notes:							
a. In weaving segments show make only necessary lane		ft, weaving	vehicles are	assumed to			
2	_	culated max	imum length	should be			
<ul> <li>Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of</li> </ul>							
Chapter 13, "Freeway Me				J 01			
				way segment.			
c. The density-based capaci				way segment,			



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under equivalent ideal conditions.

d. Volumes exceed the weaving segment capacity. The level of service is F.



#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Weaving Location: Between On Ramp from 89th street to Off Ramp to Northbound I-35 C-D Rd.

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 2150 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
3260	450	1720	0	veh/h
0.92	0.92	0.92	0.92	
886	122	467	0	
8	9	10	0	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.962	0.957	0.952	1.000	
1.00	1.00	1.00	1.00	
3685	511	1963	0	pc/h
0.402				
	3260 0.92 886 8 0 1.5 1.2 0.962 1.00 3685	3260 450 0.92 0.92 886 122 8 9 0 0 1.5 1.5 1.2 1.2 0.962 0.957 1.00 1.00 3685 511	3260     450     1720       0.92     0.92     0.92       886     122     467       8     9     10       0     0     0       1.5     1.5     1.5       1.2     1.2     1.2       0.962     0.957     0.952       1.00     1.00     1.00       3685     511     1963	3260     450     1720     0       0.92     0.92     0.92     0.92       886     122     467     0       8     9     10     0       0     0     0     0       1.5     1.5     1.5     1.5       1.2     1.2     1.2     1.2       0.962     0.957     0.952     1.000       1.00     1.00     1.00     3685     511       1963     0

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>w</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>	832	
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





W	eaving and	l Non-Weav	ring Speeds_	
Weaving intensity factor, W				
Average weaving speed, S <sub>w</sub>			mi/h	
Average non-weaving speed, S	NW		mi/h	
Weaving Segme	ent Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D			pc/mi/ln	
Level of service, LOS		F	•	
Weaving segment v/c ratio		1.031		
Weaving segment flow rate, v		6159	pc/h	
Weaving segment capacity, Cw	7	5745	veh/h	
Li	mitations o	on Weaving	Segments	
If limit reached, see note.			· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	6700	2150	a, b
		Max	Analyzed	
Density-based capacity,		2350	2002	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	1.031	d
Notes:				
a. In weaving segments shorte	r than 300	ft. weaving	vehicles are a	assumed to
make only necessary lane cl		,		
b. Weaving segments longer th	_	culated max	imum length	should be
treated as isolated merge an	d diverge a	reas using t	he procedure	s of
Chapter 13, "Freeway Merg	e and Dive	erge Segmen	ıts."	
c. The density-based capacity		e capacity o	f a basic free	way segment,
under equivalent ideal cond				
d. Volumes exceed the weaving segment capacity. The level of service is F.				



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#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis

Analyst: RA

Agency/Co.: Olsson Associates Date Performed: 5/6/2015 Analysis Time Period: AM Peak Hour

Freeway/Dir. of Travel: I-35 C-D Rd. Northbound

Weaving Location: Between On Ramp from SE Service Rd. to Off Ramp to I-240 Eastbound

2013 [EXISTING CONFIGURATION] Analysis Year: Description: I-35/I-240 Interchange Traffic Operation

Inputs\_

C-D Roadway / Multilane Highways Segment Type Weaving configuration One-Sided

Number of lanes, N 2 Weaving segment length, Ls 825 ft Freeway free-flow speed, FFS mi/h 35 Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2250 pc/h/ln Terrain type Level Grade 0.00 %

Length 0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components

 $V_{FF}$  $V_{RF}$  $V_{\text{FR}}$  $V_{RR}$ Volume, V veh/h 1233 120 770 30 Peak hour factor, PHF 0.92 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 335 209 33 8 Trucks and buses 10 2 16 0 Recreational vehicles 0 0 0 % Trucks and buses PCE, ET 1.5 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 1.2 0.990 Heavy vehicle adjustment, fHV 0.952 0.990 0.926 Driver population adjustment, fP 1.00 1.00 1.00 1.00 Flow rate, v 1407 132 904 33 pc/h Volume ratio, VR 0.418

Configuration Characteristics

Number of maneuver lanes, NWL 2.00 Interchange density, ID int/mi Minimum RF lane changes, LC<sub>RF</sub> 1 lc/pc Minimum FR lane changes, LCFR lc/pc Minimum RR lane changes, LC<sub>RR</sub> lc/pc Minimum weaving lane changes, LC<sub>MIN</sub> 1036 lc/h Weaving lane changes, LCw 1122 lc/h Non-weaving vehicle index, I<sub>NW</sub> 238 359 lc/h Non-weaving lane change, LC<sub>NW</sub> Total lane changes, LC<sub>ALL</sub> 1481 lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.359		
Average weaving speed, S <sub>w</sub>		29.7	mi/h	
Average non-weaving speed	, $S_{NW}$	21.6	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		24.4	mi/h	
Weaving segment density, D		50.8	pc/mi/ln	
Level of service, LOS		E	•	
Weaving segment v/c ratio		0.693		
Weaving segment flow rate,	v	2476	pc/h	
Weaving segment capacity,		3402	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	6888	825	a, b
		Max	Analyzed	
Density-based capacity,		2250	1786	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.693	d
NI.				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is  ${\sf F}$ .





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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour

Freeway/Dir. of Travel: I-35 C-D Rd. Northbound

Weaving Location: Between On Ramp from SE Service Rd. to Off Ramp to I-240 Eastbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

C-D Roadway / Multilane Highways Segment Type Weaving configuration One-Sided Number of lanes, N 2 Weaving segment length, Ls 825 ft Freeway free-flow speed, FFS 35 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2250

 $\begin{array}{ccc} \text{Terrain type} & \text{Level} \\ \text{Grade} & 0.00 & \% \\ \text{Length} & 0.00 & \text{mi} \end{array}$ 

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{\mathrm{FF}}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	1160	160	560	40	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	315	43	152	11	
Trucks and buses	10	2	16	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.990	0.926	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1324	176	657	44	pc/h
Volume ratio, VR	0.378				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	833	lc/h
Weaving lane changes, LC <sub>w</sub>	919	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	226	
Non-weaving lane change, LC <sub>NW</sub>	344	lc/h
Total lane changes, LC <sub>ALL</sub>	1263	lc/h





v	Veaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.316		
Average weaving speed, S <sub>w</sub>		30.2	mi/h	
Average non-weaving speed,	$S_{NW}$	23.7	mi/h	
Weaving Segm	ent Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		25.8	mi/h	
Weaving segment density, D		42.6	pc/mi/ln	
Level of service, LOS		E	•	
Weaving segment v/c ratio		0.605		
Weaving segment flow rate, v		2201	pc/h	
Weaving segment capacity, C	W	3467	veh/h	
I	imitations of	on Weaving	Segments	
If limit reached, see note.			· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	6441	825	a, b
		Max	Analyzed	,
Density-based capacity,		2250	1820	c
$C_{IWL}$ (pc/h/ln)		Max	Analyzad	
v/c ratio		1.00	Analyzed 0.605	d
V/C Tatio		1.00	0.003	u
37 .				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is  ${\sf F}$ .





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E-mail: ramini@olssonassociates.com

Operational Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour

Freeway/Dir. of Travel: I-35 C-D Rd. Northbound

Weaving Location: Between On Ramp from I-240 Eastbound to Off Ramp to I-240 Westbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35 I-240 Interchange Traffic Operation

Inputs\_

Grade 0.00 %
Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

 $V_{FF}$  $V_{RF}$  $V_{\text{FR}}$  $V_{RR}$ Volume, V 950 0 veh/h 53 1300 Peak hour factor, PHF 0.92 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 14 258 353 0 Trucks and buses 6 11 Recreational vehicles 0 0 0 0 % Trucks and buses PCE, ET 1.5 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 1 2 Heavy vehicle adjustment, fHV 0.971 0.948 0.971 1.000 Driver population adjustment, fP 1.00 1.00 1.00 1.00 Flow rate, v 59 1089 1455 0 pc/h 0.977 Volume ratio, VR

Configuration Characteristics\_

Number of maneuver lanes, NWL 2.00 Interchange density, ID int/mi Minimum RF lane changes, LC<sub>RF</sub> 1 lc/pc Minimum FR lane changes, LCFR lc/pc Minimum RR lane changes, LC<sub>RR</sub> lc/pc Minimum weaving lane changes, LC<sub>MIN</sub> lc/h Weaving lane changes, LCw lc/h Non-weaving vehicle index, I<sub>NW</sub> lc/h Non-weaving lane change, LC<sub>NW</sub> Total lane changes, LC<sub>ALL</sub> lc/h





	_Weaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W				
Average weaving speed, Sw			mi/h	
Average non-weaving speed	, $S_{NW}$		mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, I	)		pc/mi/ln	
Level of service, LOS		F	•	
Weaving segment v/c ratio		1.068		
Weaving segment flow rate,	v	2603	pc/h	
Weaving segment capacity,	$C_{\mathrm{W}}$	2367	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-			
	Min	Max	Actual	Note
Weaving length (ft)	300	13918	440	a, b
2 2 ()		Max	Analyzed	•
Density-based capacity,		2250	1219	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	1.068	d
Notes:				
a. In weaving segments sho	rter than 300	ft, weaving	vehicles are a	assumed to
make only necessary lane	changes.	, ,		
b. Weaving segments longe	r than the cal	culated max	imum length	should be
treated as isolated merge	and diverge	areas using t	he procedure	s of
Chapter 13, "Freeway Me				

c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.







#### HCS 2010: Freeway Weaving Release 6.1

Reza Amini, PE Olsson Associates 201 NW 63rd Street

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Operational Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour

Freeway/Dir. of Travel: I-35 C-D Rd. Northbound

Weaving Location: Between On Ramp from I-240 Eastbound to Off Ramp to I-240 Westbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35 I-240 Interchange Traffic Operation

Inputs\_

Segment Type C-D Roadway / Multilane Highways Weaving configuration One-Sided

Number of lanes, N Weaving segment length, L<sub>S</sub> 440 ft Freeway free-flow speed, FFS mi/h 35 Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2250 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

 $V_{FF}$  $V_{RF}$  $V_{\text{FR}}$  $V_{RR}$ Volume, V 900 0 veh/h 70 1250 Peak hour factor, PHF 0.92 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 19 245 340 0 Trucks and buses 6 11 Recreational vehicles 0 0 0 0 % Trucks and buses PCE, ET 1.5 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.971 0.948 0.971 1.000 Driver population adjustment, fP 1.00 1.00 1.00 1.00 Flow rate, v 78 1032 1399 0 pc/h 0.969 Volume ratio, VR

Configuration Characteristics\_

Number of maneuver lanes, NWL 2.00 Interchange density, ID int/mi Minimum RF lane changes, LC<sub>RF</sub> 1 lc/pc Minimum FR lane changes, LCFR lc/pc Minimum RR lane changes, LC<sub>RR</sub> lc/pc Minimum weaving lane changes, LC<sub>MIN</sub> lc/h Weaving lane changes, LCw lc/h Non-weaving vehicle index, I<sub>NW</sub> lc/h Non-weaving lane change, LC<sub>NW</sub> Total lane changes, LC<sub>ALL</sub> lc/h





W	eaving and	l Non-Weav	ing Speeds_	
Weaving intensity factor, W				
Average weaving speed, S <sub>w</sub>			mi/h	
Average non-weaving speed, S	NW		mi/h	
Weaving Segme	ent Speed,	Density, Lev	vel of Service	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D			pc/mi/ln	
Level of service, LOS		F	r	
Weaving segment v/c ratio		1.022		
Weaving segment flow rate, v		2509	pc/h	
Weaving segment capacity, Cv	v	2384	veh/h	
T.	imitations of	on Weaving	Segments	
If limit reached, see note.			~	
	Min	Max	Actual	Note
Weaving length (ft)	300	13802	440	a, b
		Max	Analyzed	, -
Density-based capacity,		2250	1228	c
C <sub>IWL</sub> (pc/h/ln)				
-1,12 (1 )		Max	Analyzed	
v/c ratio		1.00	1.022	d
Notes: a. In weaving segments shorter make only necessary lane celeb. Weaving segments longer to treated as isolated merge and Chapter 13, "Freeway Merge. The density-based capacity under equivalent ideal conditions."	hanges. han the cale d diverge a ge and Dive exceeds th	culated max areas using t erge Segmen	imum length he procedure ts."	should be s of

d. Volumes exceed the weaving segment capacity. The level of service is F.







#### HCS 2010: Freeway Weaving Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Weaving Location: Between On Ramp from I-240 Westbound to Off Ramp to SE 66th Street

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 400 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{ m FF}$	$ m V_{RF}$	$V_{FR}$	$ m V_{RR}$	
Volume, V	4407	1433	180	120	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1198	389	49	33	
Trucks and buses	7	11	1	1	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.948	0.995	0.995	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4958	1643	197	131	pc/h
Volume ratio, VR	0.266				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1840	lc/h
Weaving lane changes, LC <sub>w</sub>	1990	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	407	
Non-weaving lane change, LC <sub>NW</sub>	495	lc/h
Total lane changes, LC <sub>ALL</sub>	2485	lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.955		
Average weaving speed, Sw		40.6	mi/h	
Average non-weaving speed	, $S_{NW}$	43.4	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		42.6	mi/h	
Weaving segment density, I	)	40.6	pc/mi/ln	
Level of service, LOS		E	_	
Weaving segment v/c ratio		0.874		
Weaving segment flow rate,	$\mathbf{v}$	6929	pc/h	
Weaving segment capacity,	$C_{W}$	7656	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-	٥	·	
	Min	Max	Actual	Note
Weaving length (ft)	300	5217	400	a, b
, ,		Max	Analyzed	
Density-based capacity,		2350	1981	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.874	d
Motor:				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Weaving Location: Between On Ramp from I-240 Westbound to Off Ramp to SE 66<sup>th</sup> Street

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 400 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	3560	1250	150	100	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	967	340	41	27	
Trucks and buses	7	11	1	1	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.948	0.995	0.995	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4005	1433	164	109	pc/h
Volume ratio, VR	0.280				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1597	lc/h
Weaving lane changes, LC <sub>w</sub>	1747	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	329	
Non-weaving lane change, LC <sub>NW</sub>	294	lc/h
Total lane changes, LC <sub>ALL</sub>	2041	lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.818		
Average weaving speed, Sw		42.5	mi/h	
Average non-weaving speed	$S_{NW}$	46.6	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		45.4	mi/h	
Weaving segment density, I	)	31.4	pc/mi/ln	
Level of service, LOS		D	_	
Weaving segment v/c ratio		0.725		
Weaving segment flow rate,	v	5711	pc/h	
Weaving segment capacity,	$C_{W}$	7614	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-		· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	5366	400	a, b
		Max	Analyzed	
Density-based capacity, $C_{IWL}$ (pc/h/ln)		2350	1970	c
		Max	Analyzed	
v/c ratio		1.00	0.725	d

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from SE 59<sup>th</sup> Street to Off Ramp to SE 66<sup>th</sup> Street

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 900 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
4480	200	250	0	veh/h
0.92	0.92	0.92	0.92	
1217	54	68	0	
8	5	1	0	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.962	0.976	0.995	1.000	
1.00	1.00	1.00	1.00	
5064	223	273	0	pc/h
0.089				
	4480 0.92 1217 8 0 1.5 1.2 0.962 1.00 5064	4480     200       0.92     0.92       1217     54       8     5       0     0       1.5     1.5       1.2     1.2       0.962     0.976       1.00     1.00       5064     223	4480         200         250           0.92         0.92         0.92           1217         54         68           8         5         1           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.962         0.976         0.995           1.00         1.00         1.00           5064         223         273	4480         200         250         0           0.92         0.92         0.92         0.92           1217         54         68         0           8         5         1         0           0         0         0         0           1.5         1.5         1.5         1.5           1.2         1.2         1.2         1.2           0.962         0.976         0.995         1.000           1.00         1.00         1.00         1.00           5064         223         273         0

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	496	lc/h
Weaving lane changes, LC <sub>w</sub>	864	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	912	
Non-weaving lane change, LC <sub>NW</sub>	761	lc/h
Total lane changes, LC <sub>ALL</sub>	1625	lc/h





	Weaving and	d Non-Weav	ving Speeds_	
Weaving intensity factor, W		0.360		
Average weaving speed, Sw		51.8	mi/h	
Average non-weaving speed	, $S_{NW}$	54.8	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		54.5	mi/h	
Weaving segment density, D	)	25.5	pc/mi/ln	
Level of service, LOS		C	•	
Weaving segment v/c ratio		0.645		
Weaving segment flow rate,	v	5560	pc/h	
Weaving segment capacity,	$C_{\mathbf{W}}$	8292	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.		S	· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	3435	900	a, b
2 2 7		Max	Analyzed	,
Density-based capacity,		2350	2156	c
C <sub>IWL</sub> (pc/h/ln)				
· ·		Max	Analyzed	
v/c ratio		1.00	0.645	d
N				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from SE 59th Street to Off Ramp to SE 66th Street

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 900 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
5570	260	300	0	veh/h
0.92	0.92	0.92	0.92	
1514	71	82	0	
8	5	1	0	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.962	0.976	0.995	1.000	
1.00	1.00	1.00	1.00	
6297	290	328	0	pc/h
0.089				
	5570 0.92 1514 8 0 1.5 1.2 0.962 1.00 6297	5570 260 0.92 0.92 1514 71 8 5 0 0 1.5 1.5 1.2 1.2 0.962 0.976 1.00 1.00 6297 290	5570         260         300           0.92         0.92         0.92           1514         71         82           8         5         1           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.962         0.976         0.995           1.00         1.00         1.00           6297         290         328	5570         260         300         0           0.92         0.92         0.92         0.92           1514         71         82         0           8         5         1         0           0         0         0         0           1.5         1.5         1.5         1.5           1.2         1.2         1.2         1.2           0.962         0.976         0.995         1.000           1.00         1.00         1.00         1.00           6297         290         328         0

Number of maneuver lanes, NWL	2	ln	
Interchange density, ID	2.00	int/mi	
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc	
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc	
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc	
Minimum weaving lane changes, LC <sub>MIN</sub>	618	lc/h	
Weaving lane changes, LC <sub>w</sub>	986	lc/h	
Non-weaving vehicle index, I <sub>NW</sub>	1133		
Non-weaving lane change, LC <sub>NW</sub>	1015		lc/h
Total lane changes, LC <sub>ALL</sub>	2001	lc/h	





	Weaving and	d Non-Weav	ving Speeds_	
Weaving intensity factor, W		0.425		
Average weaving speed, Sw		50.1	mi/h	
Average non-weaving speed	, $S_{NW}$	52.3	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		52.1	mi/h	
Weaving segment density, I	)	33.2	pc/mi/ln	
Level of service, LOS		D	_	
Weaving segment v/c ratio		0.802		
Weaving segment flow rate,	$\mathbf{v}$	6915	pc/h	
Weaving segment capacity,	$C_{W}$	8292	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-		_	
	Min	Max	Actual	Note
Weaving length (ft)	300	3437	900	a, b
6 6 ()		Max	Analyzed	
Density-based capacity,		2350	2156	c
C <sub>IWL</sub> (pc/h/ln)				
-		Max	Analyzed	
v/c ratio		1.00	0.802	d
N-4				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from SE 66th Street to Off Ramp to I-240 Westbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Segment Type Freeway Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 565 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{FF}$	$V_{\text{RF}}$	$V_{\text{FR}}$	$V_{RR}$	
Volume, V	3680	100	1000	150	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1000	27	272	41	
Trucks and buses	7	1	12	1	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.995	0.943	0.995	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4140	109	1152	164	pc/h
Volume ratio, VR	0.227				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1261	lc/h
Weaving lane changes, LC <sub>w</sub>	1506	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	486	
Non-weaving lane change, LC <sub>NW</sub>	422	lc/h
Total lane changes, LC <sub>ALL</sub>	1928	lc/h





	Weaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W		0.595		
Average weaving speed, S <sub>W</sub>		46.3	mi/h	
Average non-weaving speed	$S_{NW}$	49.2	mi/h	
Weaving Segr	nent Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		48.6	mi/h	
Weaving segment density, D		28.7	pc/mi/ln	
Level of service, LOS		D	•	
Weaving segment v/c ratio		0.687		
Weaving segment flow rate,	v	5565	pc/h	
Weaving segment capacity, (		7826	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	4810	565	a, b
		Max	Analyzed	,
Density-based capacity, C <sub>IWL</sub> (pc/h/ln)		2350	2025	c
		Max	Analyzed	
v/c ratio		1.00	0.687	d
N				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is  ${\sf F}$ .





#### HCS 2010: Freeway Weaving Release 6.1

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E-mail: ramini@olssonassociates.com

Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from SE 66th Street to Off Ramp to I-240 Westbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 565 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
4560	120	1270	180	veh/h
0.92	0.92	0.92	0.92	
1239	33	345	49	
7	1	12	1	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.966	0.995	0.943	0.995	
1.00	1.00	1.00	1.00	
5130	131	1463	197	pc/h
0.227				
	4560 0.92 1239 7 0 1.5 1.2 0.966 1.00 5130	4560 120 0.92 0.92 1239 33 7 1 0 0 1.5 1.5 1.2 1.2 0.966 0.995 1.00 1.00 5130 131	4560         120         1270           0.92         0.92         0.92           1239         33         345           7         1         12           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.966         0.995         0.943           1.00         1.00         1.00           5130         131         1463	4560         120         1270         180           0.92         0.92         0.92         0.92           1239         33         345         49           7         1         12         1           0         0         0         0           1.5         1.5         1.5         1.5           1.2         1.2         1.2         1.2           0.966         0.995         0.943         0.995           1.00         1.00         1.00         5130         131         1463         197

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1594	lc/h
Weaving lane changes, LC <sub>w</sub>	1839	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	602	
Non-weaving lane change, LC <sub>NW</sub>	633	lc/h
Total lane changes, LC <sub>ALL</sub>	2472	lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.724		
Average weaving speed, Sw		44.0	mi/h	
Average non-weaving speed	, $S_{NW}$	45.2	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		44.9	mi/h	
Weaving segment density, D	)	38.5	pc/mi/ln	
Level of service, LOS		E	•	
Weaving segment v/c ratio		0.856		
Weaving segment flow rate,	v	6921	pc/h	
Weaving segment capacity,		7814	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.		8		
	Min	Max	Actual	Note
Weaving length (ft)	300	4848	565	a, b
		Max	Analyzed	
Density-based capacity, C <sub>IWL</sub> (pc/h/ln)		2350	2022	c
<b>u</b>		Max	Analyzed	
v/c ratio		1.00	0.856	d
XI .				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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E-mail: ramini@olssonassociates.com

\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour

Freeway/Dir. of Travel: I-35 C-D Rd. Southbound

Weaving Location: Between On Ramp from I-240 Westbound to Off Ramp to I-240 Eastbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Segment Type C-D Roadway / Multilane Highways
Weaving configuration One-Sided
Number of lanes N 2 In

Number of lanes, N Weaving segment length, Ls 400 ft Freeway free-flow speed, FFS 35 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2250 pc/h/ln Terrain type Level 0.00 %

Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	0	500	250	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	0	136	68	0	
Trucks and buses	0	14	22	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	1.000	0.935	0.901	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	582	302	0	pc/h
Volume ratio, VR	1.000				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	884	lc/h
Weaving lane changes, LC <sub>w</sub>	922	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	0	
Non-weaving lane change, LC <sub>NW</sub>	0	lc/h
Total lane changes, LC <sub>ALL</sub>	922	lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.437		
Average weaving speed, Sw		28.9	mi/h	
Average non-weaving speed	, $S_{NW}$	26.5	mi/h	
Weaving Seg	ment Speed,	Density, Lev	vel of Service	e and Capacity
Weaving segment speed, S		28.9	mi/h	
Weaving segment density, I	)	15.3	pc/mi/ln	
Level of service, LOS		В	_	
Weaving segment v/c ratio		0.371		
Weaving segment flow rate,	v	884	pc/h	
Weaving segment capacity,	$C_{W}$	2384	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-		·	
	Min	Max	Actual	Note
Weaving length (ft)	300	14232	400	a, b
		Max	Analyzed	
Density-based capacity,		2250	1192	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.371	d
N-4				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour

Freeway/Dir. of Travel: I-35 C-D Rd. Southbound

Weaving Location: Between On Ramp from I-240 Westbound to Off Ramp to I-240 Eastbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

C-D Roadway / Multilane Highways Segment Type Weaving configuration One-Sided Number of lanes, N Weaving segment length, Ls 400 ft Freeway free-flow speed, FFS 35 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2250 Terrain type Level

Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

#### Volume Components

	$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	0	750	300	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	0	204	82	0	
Trucks and buses	0	14	22	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	1.000	0.935	0.901	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	872	362	0	pc/h
Volume ratio, VR	1.000				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1234	lc/h
Weaving lane changes, LC <sub>w</sub>	1272	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	0	
Non-weaving lane change, LC <sub>NW</sub>	0	lc/h
Total lane changes, LC <sub>ALL</sub>	1272	lc/h





	Weaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W		0.563		
Average weaving speed, S <sub>w</sub>		27.8	mi/h	
Average non-weaving speed	, $S_{NW}$	23.2	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		27.8	mi/h	
Weaving segment density, D	ı	22.2	pc/mi/ln	
Level of service, LOS		В	-	
Weaving segment v/c ratio		0.518		
Weaving segment flow rate,	v	1234	pc/h	
Weaving segment capacity,	$C_{\mathbf{w}}$	2384	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.		S	۰ _	
	Min	Max	Actual	Note
Weaving length (ft)	300	14232	400	a, b
		Max	Analyzed	,
Density-based capacity,		2250	1192	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.518	d
NY .				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is  ${\sf F}$ .





#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from I-240 Eastbound to Off Ramp to SE 82<sup>nd</sup> Street

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 675 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
3710	1620	70	130	veh/h
0.92	0.92	0.92	0.92	
1008	440	19	35	
7	9	3	2	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.966	0.957	0.985	0.990	
1.00	1.00	1.00	1.00	
4174	1840	77	143	pc/h
0.308				
	3710 0.92 1008 7 0 1.5 1.2 0.966 1.00 4174	3710 1620 0.92 0.92 1008 440 7 9 0 0 1.5 1.5 1.2 1.2 0.966 0.957 1.00 1.00 4174 1840	3710         1620         70           0.92         0.92         0.92           1008         440         19           7         9         3           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.966         0.957         0.985           1.00         1.00         1.00           4174         1840         77	3710         1620         70         130           0.92         0.92         0.92         0.92           1008         440         19         35           7         9         3         2           0         0         0         0           1.5         1.5         1.5         1.5           1.2         1.2         1.2         1.2           0.966         0.957         0.985         0.990           1.00         1.00         1.00         1.00           4174         1840         77         143

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1917	lc/h
Weaving lane changes, LC <sub>W</sub>	2208	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	583	
Non-weaving lane change, LC <sub>NW</sub>	485	lc/h
Total lane changes, LC <sub>ALL</sub>	2693	lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.673		
Average weaving speed, Sw		44.9	mi/h	
Average non-weaving speed,	$S_{\rm NW}$	43.7	mi/h	
Weaving Segr	nent Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		44.1	mi/h	
Weaving segment density, D		35.4	pc/mi/ln	
Level of service, LOS		E		
Weaving segment v/c ratio		0.799		
Weaving segment flow rate,	V	6234	pc/h	
Weaving segment capacity, C	Cw	7541	veh/h	
]	Limitations	on Weaving	Segments	
If limit reached, see note.		C	· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	5665	675	a, b
		Max	Analyzed	
Density-based capacity,		2350	1968	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.799	d
Notes:				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from I-240 Eastbound to Off Ramp to SE 82<sup>nd</sup> Street

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 675 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{ m FF}$	$ m V_{RF}$	$ m V_{FR}$	$ m V_{RR}$	
Volume, V	4617	1933	63	117	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1255	525	17	32	
Trucks and buses	7	9	3	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.957	0.985	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5194	2196	70	128	pc/h
Volume ratio, VR	0.299				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	2266	lc/h
Weaving lane changes, LC <sub>w</sub>	2557	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	718	
Non-weaving lane change, LC <sub>NW</sub>	692	lc/h
Total lane changes, LC <sub>ALL</sub>	3249	lc/h





	Weaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W		0.781		
Average weaving speed, S <sub>W</sub>		43.1	mi/h	
Average non-weaving speed,	$S_{NW}$	39.6	mi/h	
Weaving Segr	ment Speed,	Density, Le	vel of Service	and Capacity
Weaving segment speed, S		40.6	mi/h	
Weaving segment density, D		46.8	pc/mi/ln	
Level of service, LOS		E	•	
Weaving segment v/c ratio		0.960		
Weaving segment flow rate,	v	7588	pc/h	
Weaving segment capacity, (	$C_{\mathbf{W}}$	7637	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.		S	·	
	Min	Max	Actual	Note
Weaving length (ft)	300	5569	675	a, b
		Max	Analyzed	
Density-based capacity,		2350	1976	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.960	d
N. C.				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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#### Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location:Between Walker Ave. to Santa Fe Ave.Analysis Year:2013 [EXISTING CONFIGURATION]Description:I-35\_I-240 Interchange Traffic Operation

#### \_Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 500 ft Freeway free-flow speed, FFS 60 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

#### \_Conversion to pc/h Under Base Conditions

#### Volume Components

	$V_{ ext{FF}}$	$V_{ ext{RF}}$	$V_{\text{FR}}$	$V_{RR}$	
Volume, V	4600	450	550	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1250	122	149	0	
Trucks and buses	6	2	2	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5150	494	604	0	pc/h
Volume ratio, VR	0.176				•

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1098	lc/h
Weaving lane changes, LC <sub>w</sub>	1311	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	515	
Non-weaving lane change, LC <sub>NW</sub>	562	lc/h
Total lane changes, LC <sub>ALL</sub>	1873	lc/h





Wea	aving and I	Non-Weavir	ng Speeds	
Weaving intensity factor, W		0.641		
Average weaving speed, S <sub>w</sub>		42.4	mi/h	
Average non-weaving speed, S <sub>NV</sub>	W	44.6	mi/h	
Weaving Segmen	t Speed, D	ensity, Leve	el of Service	and Capacity
Weaving segment speed, S		44.2	mi/h	
Weaving segment density, D		35.3	pc/mi/ln	
Level of service, LOS		E	•	
Weaving segment v/c ratio		0.777		
Weaving segment flow rate, v		6248	pc/h	
Weaving segment capacity, Cw		7806	veh/h	
Lim	itations on	Weaving S	egments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	4290	500	a. b
		Max	Analyzed	-, -
Density-based capacity,		2350	2010	c
$C_{IWL}$ (pc/h/ln)		Max	Analyzed	
v/c ratio		1.00	0.777	d
V/C Tatio		1.00	0.777	u

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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E-mail: ramini@olssonassociates.com

#### \_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between Walker Ave. to Santa Fe Ave.
Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Inputs\_

Segment Type Freeway Weaving configuration Number of lanes, N One-Sided 4 Weaving segment length,  $L_{\scriptscriptstyle \rm S}$ 500 ft Freeway free-flow speed, FFS 60 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level % Grade 0.00 Length 0.00 mi

### \_Conversion to pc/h Under Base Conditions\_

#### Volume Components

	$V_{\mathrm{FF}}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	4930	500	650	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1340	136	177	0	
Trucks and buses	6	2	2	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5519	549	714	0	pc/h
Volume ratio, VR	0.176				-

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1263	lc/h
Weaving lane changes, LC <sub>w</sub>	1476	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	552	
Non-weaving lane change, LC <sub>NW</sub>	638	lc/h
Total lane changes, LC <sub>ALL</sub>	2114	lc/h





	_Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.705		
Average weaving speed, Sw		41.4	mi/h	
Average non-weaving speed	$l, S_{NW}$	42.8	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		442.5	mi/h	
Weaving segment density, I	)	39.9	pc/mi/ln	
Level of service, LOS		E		
Weaving segment v/c ratio		0.847		
Weaving segment flow rate,	v	6782	pc/h	
Weaving segment capacity,	$C_{W}$	7775	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-			
	Min	Max	Actual	Note
Weaving length (ft)	300	4396	500	a, b
, ,		Max	Analyzed	
Density-based capacity, C <sub>IWL</sub> (pc/h/ln)		2350	2002	c
· · · · · ·		Max	Analyzed	
v/c ratio		1.00	0.847	d

- a. In weaving segments shorter than  $300 \, \, \mathrm{ft}$ , weaving vehicles are assumed to make only necessary lane changes.
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
  c. The density-based capacity exceeds the capacity of a basic freeway segment,
- under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from Shields Blvd. to Off Ramp to I-35 Southbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Segment Type Freeway Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, L<sub>S</sub> 1400 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 Length 0.00 mi

#### \_Conversion to pc/h Under Base Conditions\_

#### Volume Components

	$V_{\text{FF}}$	$V_{RF}$	$V_{\text{FR}}$	$V_{RR}$	
Volume, V	3270	280	1180	70	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	889	76	321	19	
Trucks and buses	6	1	6	1	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.995	0.971	0.995	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3661	306	1321	76	pc/h
Volume ratio, VR	0.303				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	306	lc/h
Weaving lane changes, LC <sub>w</sub>	586	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	1046	
Non-weaving lane change, LC <sub>NW</sub>	951	lc/h
Total lane changes, LC <sub>ALL</sub>	1537	lc/h





	_Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W	r	0.243		
Average weaving speed, Sw		55.2	mi/h	
Average non-weaving speed	$l, S_{NW}$	54.2	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		54.5	mi/h	
Weaving segment density, I	)	32.8	pc/mi/ln	
Level of service, LOS		D	•	
Weaving segment v/c ratio		0.882		
Weaving segment flow rate,	v	5364	pc/h	
Weaving segment capacity,		5904	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-	٥	· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	5620	1400	a, b
		Max	Analyzed	
Density-based capacity, $C_{IWL}$ (pc/h/ln)		2350	2027	c
4		Max	Analyzed	
v/c ratio		1.00	0.882	d
N.				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from Shields Blvd. to Off Ramp to I-35 Southbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 1400 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

$V_{RF}$ $V_{21}$ $V_{RR}$	$V_{21}$	$ m V_{RF}$	$ m V_{FF}$	
360 1210 90 veh/h	1210	360	3490	Volume, V
0.92 0.92 0.92	0.92	0.92	0.92	Peak hour factor, PHF
98 329 24	329	98	948	Peak 15-min volume, V <sub>15</sub>
1 6 1 %	6	1	6	Trucks and buses
0 0 %	0	0	0	Recreational vehicles
1.5 1.5 1.5	1.5	1.5	1.5	Trucks and buses PCE, ET
1.2 1.2 1.2	1.2	1.2	1.2	Recreational vehicle PCE, ER
0.995 0.971 0.995	0.971	0.995	0.971	Heavy vehicle adjustment, fHV
1.00 1.00 1.00	1.00	1.00	1.00	Driver population adjustment, fP
393 1355 98 pc/h	1355	393	3907	Flow rate, v
			0.304	Volume ratio, VR
98     329     24       1     6     1     %       0     0     0     %       1.5     1.5     1.5     1.5       1.2     1.2     1.2     0.995       1.00     1.00     1.00     1.00	329 6 0 1.5 1.2 0.971 1.00	98 1 0 1.5 1.2 0.995 1.00	948 6 0 1.5 1.2 0.971 1.00 3907	Peak 15-min volume, V <sub>15</sub> Trucks and buses Recreational vehicles Trucks and buses PCE, ET Recreational vehicle PCE, ER Heavy vehicle adjustment, fHV Driver population adjustment, fP Flow rate, v

Number of maneuver lanes, NWL	2	ln	
Interchange density, ID	2.00	int/mi	
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc	
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc	
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc	
Minimum weaving lane changes, LC <sub>MIN</sub>	393	lc/h	
Weaving lane changes, LC <sub>w</sub>	673	lc/h	
Non-weaving vehicle index, I <sub>NW</sub>	1121		
Non-weaving lane change, LC <sub>NW</sub>	1006		lc/h
Total lane changes, LC <sub>ALL</sub>	1679	lc/h	





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.261		
Average weaving speed, Sw		54.7	mi/h	
Average non-weaving speed	, $S_{NW}$	53.0	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		53.5	mi/h	
Weaving segment density, D	)	35.9	pc/mi/ln	
Level of service, LOS		E	_	
Weaving segment v/c ratio		0.946		
Weaving segment flow rate,	v	5753	pc/h	
Weaving segment capacity,	$C_{\mathbf{W}}$	5904	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.		C	· · ·	
	Min	Max	Actual	Note
Weaving length (ft)	300	5625	1400	a, b
		Max	Analyzed	,
Density-based capacity,		2350	2027	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.946	d
27.				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is  ${\sf F}$ .





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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from I-35 Southbound to Off Ramp to I-35 Northbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 500 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{FF}$	$ m V_{RF}$	$V_{21}$	$ m V_{RR}$	
Volume, V	2600	250	950	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	707	68	258	0	
Trucks and buses	6	22	11	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.901	0.948	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2911	302	1089	0	pc/h
Volume ratio, VR	0.323				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1391	lc/h
Weaving lane changes, LC <sub>W</sub>	1511	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	291	
Non-weaving lane change, LC <sub>NW</sub>	293	lc/h
Total lane changes, LC <sub>ALL</sub>	1804	lc/h





	Weaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W		0.622		
Average weaving speed, S <sub>w</sub>		45.8	mi/h	
Average non-weaving speed,	$S_{NW} \\$	48.1	mi/h	
Weaving Segr	ment Speed,	Density, Le	vel of Service	and Capacity
Weaving segment speed, S		47.3	mi/h	
Weaving segment density, D		30.3	pc/mi/ln	
Level of service, LOS		D	-	
Weaving segment v/c ratio		0.738		
Weaving segment flow rate,	v	4302	pc/h	
Weaving segment capacity, C		5656	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.		8		
	Min	Max	Actual	Note
Weaving length (ft)	300	5836	500	a, b
		Max	Analyzed	,
Density-based capacity,		2350	1942	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.738	d
N				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is  ${\sf F}$ .





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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from I-35 Southbound to Off Ramp to I-35 Northbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 500 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$ m V_{FF}$	$ m V_{RF}$	$V_{21}$	$ m V_{RR}$	
Volume, V	2950	300	900	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	802	82	245	0	
Trucks and buses	6	22	11	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.901	0.948	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3303	362	1032	0	pc/h
Volume ratio, VR	0.323				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1394	lc/h
Weaving lane changes, LC <sub>W</sub>	1514	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	330	
Non-weaving lane change, LC <sub>NW</sub>	374	lc/h
Total lane changes, LC <sub>ALL</sub>	1888	lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.645		
Average weaving speed, S <sub>W</sub>		45.4	mi/h	
Average non-weaving speed	, $S_{NW}$	47.4	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		46.8	mi/h	
Weaving segment density, I	)	33.4	pc/mi/ln	
Level of service, LOS		D	•	
Weaving segment v/c ratio		0.797		
Weaving segment flow rate,	v	4697	pc/h	
Weaving segment capacity,	$C_{W}$	5720	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-	٥	· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	5549	500	a, b
		Max	Analyzed	
Density-based capacity,		2350	1964	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.797	d
Nistan				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from I-35 Northbound to Off Ramp to Pole Rd.

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 1500 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	2688	712	162	88	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	730	193	44	24	
Trucks and buses	6	16	2	7	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.926	0.990	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3009	836	178	99	pc/h
Volume ratio, VR	0.246				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1014	lc/h
Weaving lane changes, LC <sub>w</sub>	1307	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	932	
Non-weaving lane change, LC <sub>NW</sub>	875	lc/h
Total lane changes, LC <sub>ALL</sub>	2182	lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.304		
Average weaving speed, Sw		53.4	mi/h	
Average non-weaving speed	, $S_{NW}$	51.1	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		51.6	mi/h	
Weaving segment density, D	)	26.6	pc/mi/ln	
Level of service, LOS		C		
Weaving segment v/c ratio		0.660		
Weaving segment flow rate,	$\mathbf{v}$	4122	pc/h	
Weaving segment capacity,	$C_{W}$	6061	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-	C	·	
	Min	Max	Actual	Note
Weaving length (ft)	300	5012	1500	a, b
		Max	Analyzed	
Density-based capacity,		2350	2081	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.660	d
**				
Notes:				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





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#### \_Operational Analysis\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from I-35 Northbound to Off Ramp to Pole Rd.

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### \_Inputs\_

Segment Type Freeway Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, L<sub>S</sub> 1500 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level Grade % 0.00 Length 0.00

#### Conversion to pc/h Under Base Conditions

#### Volume Components

	$V_{\mathrm{FF}}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	3250	442	292	158	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	883	120	79	43	
Trucks and buses	6	16	2	7	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.926	0.990	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3639	519	321	178	pc/h
Volume ratio, VR	0.180				•

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	840	lc/h
Weaving lane changes, LC <sub>w</sub>	1133	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	1145	
Non-weaving lane change, LC <sub>NW</sub>	1022	lc/h
Total lane changes, LC <sub>ALL</sub>	2155	lc/h





	Weaving and	d Non-Weav	ring Speeds	
Weaving intensity factor, W		0.301		
Average weaving speed, S <sub>W</sub>		53.4	mi/h	
Average non-weaving speed,	$S_{\rm NW}$	51.5	mi/h	
Weaving Segn	nent Speed,	Density, Le	vel of Service	and Capacity
Weaving segment speed, S		51.8	mi/h	
Weaving segment density, D		29.9	pc/mi/ln	
Level of service, LOS		D	-	
Weaving segment v/c ratio		0.728		
Weaving segment flow rate, v	V	4657	pc/h	
Weaving segment capacity, C	Cw	6213	veh/h	
]	Limitations	on Weaving	Segments	
If limit reached, see note.		C	·	
	Min	Max	Actual	Note
Weaving length (ft)	300	4337	1500	a, b
		Max	Analyzed	
Density-based capacity,		2350	2133	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.728	d
Notes:				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from Pole Rd. to Off Ramp to I-35 C-D Rd. Northbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 1700 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	2130	170	520	30	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	579	46	141	8	
Trucks and buses	7	2	11	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.990	0.948	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2396	187	596	33	pc/h
Volume ratio VR	0.244				•

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	783	lc/h
Weaving lane changes, LC <sub>w</sub>	1099	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	826	
Non-weaving lane change, LC <sub>NW</sub>	844	lc/h
Total lane changes, LC <sub>ALL</sub>	1943	lc/h





	Weaving and	d Non-Weav	ving Speeds_	
Weaving intensity factor, W		0.251		
Average weaving speed, S <sub>w</sub>		55.0	mi/h	
Average non-weaving speed	, $S_{NW}$	54.2	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		54.4	mi/h	
Weaving segment density, I	)	19.7	pc/mi/ln	
Level of service, LOS		В	_	
Weaving segment v/c ratio		0.510		
Weaving segment flow rate,	v	3212	pc/h	
Weaving segment capacity,	$C_{\mathbf{W}}$	6081	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.		C	· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	4989	1700	a, b
		Max	Analyzed	
Density-based capacity,		2350	2098	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.510	d
37.				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from Pole Rd. to Off Ramp to I-35 C-D Rd. Northbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 1700 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	2707	383	313	67	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	736	104	85	18	
Trucks and buses	7	2	11	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.990	0.948	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3045	420	359	74	pc/h
Volume ratio, VR	0.200				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	779	lc/h
Weaving lane changes, LC <sub>w</sub>	1095	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	1060	
Non-weaving lane change, LC <sub>NW</sub>	986	lc/h
Total lane changes, LC <sub>ALL</sub>	2081	lc/h





	_Weaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W	7	0.265		
Average weaving speed, Sw		54.5	mi/h	
Average non-weaving speed	$l, S_{NW}$	53.2	mi/h	
Weaving Seg	gment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		53.4	mi/h	
Weaving segment density, I	)	24.3	pc/mi/ln	
Level of service, LOS		C	_	
Weaving segment v/c ratio		0.609		
Weaving segment flow rate,	v	3898	pc/h	
Weaving segment capacity,	$C_{W}$	6183	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	_		-	
	Min	Max	Actual	Note
Weaving length (ft)	300	4535	1700	a, b
		Max	Analyzed	
Density-based capacity,		2350	2133	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.609	d
Notes:				
T	1 200		1 1 1	1.

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of
- Chapter 13, "Freeway Merge and Diverge Segments."

  c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
  d. Volumes exceed the weaving segment capacity. The level of service is F.

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#### HCS 2010: Freeway Weaving Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from I-35 C-D Rd. Northbound to Off Ramp to I-35 C-D Rd. Southbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 540 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$ m V_{FF}$	$ m V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	1800	1300	500	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	489	353	136	0	
Trucks and buses	7	6	14	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.971	0.935	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2025	1455	582	0	pc/h
Volume ratio, VR	0.501				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	582	lc/h
Weaving lane changes, LC <sub>w</sub>	713	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	219	
Non-weaving lane change, LC <sub>NW</sub>	132	lc/h
Total lane changes, LC <sub>ALL</sub>	845	lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.322		
Average weaving speed, S <sub>w</sub>		52.8	mi/h	
Average non-weaving speed	, $S_{NW}$	54.3	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		53.6	mi/h	
Weaving segment density, D		25.3	pc/mi/ln	
Level of service, LOS		C	•	
Weaving segment v/c ratio		0.849		
Weaving segment flow rate,	v	3925	pc/h	
Weaving segment capacity,		4624	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.		8		
	Min	Max	Actual	Note
Weaving length (ft)	300	7844	540	a, b
2 2 ( )		Max	Analyzed	,
Density-based capacity,		2350	1791	c
C <sub>IWL</sub> (pc/h/ln)				
· · · · · · · · · · · · · · · · · · ·		Max	Analyzed	
v/c ratio		1.00	0.849	d
N				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is  ${\sf F}$ .





#### HCS 2010: Freeway Weaving Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from I-35 C-D Rd. Northbound to Off Ramp to I-35 C-D Rd. Southbound

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 540 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
2340	1250	750	0	veh/h
0.92	0.92	0.92	0.92	
636	340	204	0	
7	6	14	0	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.966	0.971	0.935	1.000	
1.00	1.00	1.00	1.00	
2632	1399	872	0	pc/h
0.463				
	2340 0.92 636 7 0 1.5 1.2 0.966 1.00 2632	2340     1250       0.92     0.92       636     340       7     6       0     0       1.5     1.5       1.2     1.2       0.966     0.971       1.00     1.00       2632     1399	2340         1250         750           0.92         0.92         0.92           636         340         204           7         6         14           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.966         0.971         0.935           1.00         1.00         1.00           2632         1399         872	2340     1250     750     0       0.92     0.92     0.92     0.92       636     340     204     0       7     6     14     0       0     0     0     0       1.5     1.5     1.5     1.5       1.2     1.2     1.2     1.2       0.966     0.971     0.935     1.000       1.00     1.00     1.00     1.00       2632     1399     872     0

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	872	lc/h
Weaving lane changes, LC <sub>w</sub>	1003	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	284	
Non-weaving lane change, LC <sub>NW</sub>	257	lc/h
Total lane changes, LC <sub>ALL</sub>	1260	lc/h





	_Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.441		
Average weaving speed, S <sub>w</sub>		49.7	mi/h	
Average non-weaving speed	, $S_{NW}$	50.9	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		50.3	mi/h	
Weaving segment density, I	)	32.5	pc/mi/ln	
Level of service, LOS		D	•	
Weaving segment v/c ratio		0.946		
Weaving segment flow rate,	v	4738	pc/h	
Weaving segment capacity,	$C_{W}$	5006	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-		·	
	Min	Max	Actual	Note
Weaving length (ft)	300	7399	540	a, b
		Max	Analyzed	
Density-based capacity, $C_{IWL}$ (pc/h/ln)		2350	1825	c
<u> </u>		Max	Analyzed	
v/c ratio		1.00	0.946	d

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is  ${\sf F}$ .





#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from I-35 Southbound to Off Ramp to Shields Blvd.

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 1560 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
2872	778	228	122	veh/h
0.92	0.92	0.92	0.92	
780	211	62	33	
7	10	1	1	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.966	0.952	0.995	0.995	
1.00	1.00	1.00	1.00	
3231	888	249	133	pc/h
0.253				
	2872 0.92 780 7 0 1.5 1.2 0.966 1.00 3231	2872 778 0.92 0.92 780 211 7 10 0 0 1.5 1.5 1.2 1.2 0.966 0.952 1.00 1.00 3231 888	2872         778         228           0.92         0.92         0.92           780         211         62           7         10         1           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.966         0.952         0.995           1.00         1.00         1.00           3231         888         249	2872         778         228         122           0.92         0.92         0.92         0.92           780         211         62         33           7         10         1         1           0         0         0         0           1.5         1.5         1.5         1.5           1.2         1.2         1.2         1.2           0.966         0.952         0.995         0.995           1.00         1.00         1.00         3231         888         249         133

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	0	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	0	lc/h
Weaving lane changes, LC <sub>w</sub>	300	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	1050	
Non-weaving lane change, LC <sub>NW</sub>	961	lc/h
Total lane changes, LC <sub>ALL</sub>	1261	lc/h





	_Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.191		
Average weaving speed, Sw		57.0	mi/h	
Average non-weaving speed		57.8	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		57.6	mi/h	
Weaving segment density, I	)	26.1	pc/mi/ln	
Level of service, LOS		C	_	
Weaving segment v/c ratio		0.721		
Weaving segment flow rate,	v	4349	pc/h	
Weaving segment capacity,	$C_{W}$	6032	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	_		· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	5081	1560	a, b
		Max	Analyzed	
Density-based capacity, C <sub>IWL</sub> (pc/h/ln)		2350	2081	c
		Max	Analyzed	
v/c ratio		1.00	0.721	d

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is  ${\sf F}$ .





#### HCS 2010: Freeway Weaving Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from I-35 Southbound to Off Ramp to Shields Blvd.

Analysis Year: 2013 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 1560 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
3265	975	325	175	veh/h
0.92	0.92	0.92	0.92	
887	265	88	48	
7	10	1	1	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.966	0.952	0.995	0.995	
1.00	1.00	1.00	1.00	
3673	1113	355	191	pc/h
0.275				
	3265 0.92 887 7 0 1.5 1.2 0.966 1.00 3673	3265 975 0.92 0.92 887 265 7 10 0 0 1.5 1.5 1.2 1.2 0.966 0.952 1.00 1.00 3673 1113	3265     975     325       0.92     0.92     0.92       887     265     88       7     10     1       0     0     0       1.5     1.5     1.5       1.2     1.2     1.2       0.966     0.952     0.995       1.00     1.00     1.00       3673     1113     355	3265     975     325     175       0.92     0.92     0.92     0.92       887     265     88     48       7     10     1     1       0     0     0     0       1.5     1.5     1.5       1.2     1.2     1.2       0.966     0.952     0.995     0.995       1.00     1.00     1.00       3673     1113     355     191

Number of maneuver lanes, NWL	2	ln	
Interchange density, ID	2.00	int/mi	
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc	
Minimum FR lane changes, LC <sub>FR</sub>	0	lc/pc	
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc	
Minimum weaving lane changes, LC <sub>MIN</sub>	0	lc/h	
Weaving lane changes, LC <sub>w</sub>	300	lc/h	
Non-weaving vehicle index, I <sub>NW</sub>	1206		
Non-weaving lane change, LC <sub>NW</sub>	1064		lc/h
Total lane changes, LC <sub>ALL</sub>	1364	lc/h	





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.203		
Average weaving speed, S <sub>W</sub>		56.6	mi/h	
Average non-weaving speed	$S_{NW}$	56.5	mi/h	
Weaving Segr	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		56.5	mi/h	
Weaving segment density, D		31.5	pc/mi/ln	
Level of service, LOS		D	_	
Weaving segment v/c ratio		0.862		
Weaving segment flow rate,	v	5152	pc/h	
Weaving segment capacity, of	$C_{\mathbf{W}}$	5977	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.		S	·	
	Min	Max	Actual	Note
Weaving length (ft)	300	5321	1560	a, b
		Max	Analyzed	
Density-based capacity,		2350	2062	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.862	d
Notes				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is  ${\sf F}$ .





#### HCS 2010: Freeway Weaving Release 6.1

Reza Amini, PE Olsson Associates

201 NW 63<sup>rd</sup> Street-Suite 130 Oklahoma City, OK 73116 Phone: (405) 242-6642 Fax: (405) 242-6601

E-mail: ramini@olssonassociates.com

Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location:Between Santa Fe Ave. to Walker Ave.Analysis Year:2013 [EXISTING CONFIGURATION]Description:I-35\_I-240 Interchange Traffic Operation

\_Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 450 ft Freeway free-flow speed, FFS 60 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$ m V_{FF}$	$ m V_{RF}$	$ m V_{FR}$	$ m V_{RR}$	
Volume, V	3850	600	510	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1046	163	139	0	
Trucks and buses	6	2	2	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4310	659	560	0	pc/h
Volume ratio, VR	0.220				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1219	lc/h
Weaving lane changes, LC <sub>w</sub>	1403	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	388	
Non-weaving lane change, LC <sub>NW</sub>	361	lc/h
Total lane changes, LC <sub>ALL</sub>	1764	lc/h





	Weaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W		0.664		
Average weaving speed, S <sub>w</sub>		42.0	mi/h	
Average non-weaving speed,	$S_{\rm NW}$	44.6	mi/h	
Weaving Segment Speed, Density, Level of Service and Capacity				
Weaving segment speed, S		44.0	mi/h	
Weaving segment density, D		31.4	pc/mi/ln	
Level of service, LOS		D	-	
Weaving segment v/c ratio		0.701		
Weaving segment flow rate,	V	5529	pc/h	
Weaving segment capacity, C	Cw	7654	veh/h	
]	Limitations	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	4747	450	a. b
wearing rengin (ii)	200	Max	Analyzed	ш, о
Density-based capacity,		2350	1971	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.701	d

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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#### Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/6/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location:Between Santa Fe Ave. to Walker Ave.Analysis Year:2013 [EXISTING CONFIGURATION]Description:I-35\_I-240 Interchange Traffic Operation

#### Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 450 ft Freeway free-flow speed, FFS 60 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

#### \_Conversion to pc/h Under Base Conditions\_

#### Volume Components

$V_{FF}$	$ m V_{RF}$	$ m V_{FR}$	$V_{RR}$	
4320	650	620	0	veh/h
0.92	0.92	0.92	0.92	
1174	177	168	0	
6	2	2	0	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.971	0.990	0.990	0.990	
1.00	1.00	1.00	1.00	
4837	714	681	0	pc/h
0.224				
	4320 0.92 1174 6 0 1.5 1.2 0.971 1.00 4837	4320     650       0.92     0.92       1174     177       6     2       0     0       1.5     1.5       1.2     1.2       0.971     0.990       1.00     1.00       4837     714	4320         650         620           0.92         0.92         0.92           1174         177         168           6         2         2           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.971         0.990         0.990           1.00         1.00         1.00           4837         714         681	4320         650         620         0           0.92         0.92         0.92         0.92           1174         177         168         0           6         2         2         0           0         0         0         0           1.5         1.5         1.5         1.5           1.2         1.2         1.2         1.2           0.971         0.990         0.990         0.990           1.00         1.00         1.00         1.00           4837         714         681         0

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1395	lc/h
Weaving lane changes, LC <sub>W</sub>	1579	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	435	
Non-weaving lane change, LC <sub>NW</sub>	470	lc/h
Total lane changes, LC <sub>ALL</sub>	2049	lc/h





Weaving and Non-Weaving Speeds					
Weaving intensity factor, W		0.747			
Average weaving speed, S <sub>w</sub>		40.8	mi/h		
Average non-weaving speed, S	NW	42.5	mi/h		
Weaving Segme	ent Speed, I	Density, Lev	el of Service	e and Capacity	
Weaving segment speed, S		42.1	mi/h		
Weaving segment density, D		37.0	pc/mi/ln		
Level of service, LOS		E	_		
Weaving segment v/c ratio		0.791			
Weaving segment flow rate, v		6232	pc/h		
Weaving segment capacity, Cv	ī	7647	veh/h		
Li	mitations o	n Weaving	Segments		
If limit reached, see note.		٥	· _		
	Min	Max	Actual	Note	
Weaving length (ft)	300	4781	450	a, b	
8 - 8 - (4)		Max	Analyzed	,	
Density-based capacity, C <sub>IWL</sub> (pc/h/ln)		2350	1969	c	
CIWL (pc/ II/ III)		Max	Analyzed		
v/c ratio		1.00	0.791	d	
1/0 14110		1.00	0.771	u	

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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#### Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Weaving Location: Between On Ramp from 89th street to Off Ramp Northbound I-35 C-D Rd.

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

#### Inputs\_

Segment Type Freeway Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 2150 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2150 Terrain type Level Grade 0.00 % Length 0.00 mi

#### \_Conversion to pc/h Under Base Conditions

#### Volume Components

	$V_{ ext{FF}}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	3766	635	2629	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1023	173	714	0	
Trucks and buses	8	9	10	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.957	0.952	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4257	721	3000	0	pc/h
Volume ratio, VR	0.466				•

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>w</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>	1926	
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





	Weaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W				
Average weaving speed, S <sub>w</sub>			mi/h	
Average non-weaving speed,	$S_{\rm NW}$		mi/h	
Weaving Segn	nent Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D			pc/mi/ln	
Level of service, LOS		F	-	
Weaving segment v/c ratio		1.550		
Weaving segment flow rate, v	V	7672	pc/h	
Weaving segment capacity, C	Cw .	4948	veh/h	
]	Limitations	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	7436	2150	a, b
		Max	Analyzed	,
Density-based capacity,		2350	1946	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	1.550	d
Notes: a. In weaving segments short make only necessary lane b. Weaving segments longer treated as isolated merge a Chapter 13, "Freeway Met c. The density-based capacity under equivalent ideal con	changes. than the cal and diverge a rge and Dive y exceeds th	culated max areas using t erge Segmer e capacity o	imum length he procedure its."	should be s of way segment,

d. Volumes exceed the weaving segment capacity. The level of service is F.

### **ACCESS JUSTIFICATION REPORT**





#### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Weaving Location: Between On Ramp from 89th street to Off Ramp Northbound I-35 C-D Rd.

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Segment Type Freeway Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 2150 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
3911	572	2299	0	veh/h
0.92	0.92	0.92	0.92	
1063	155	625	0	
8	9	10	0	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.962	0.957	0.952	1.000	
1.00	1.00	1.00	1.00	
4421	650	2624	0	pc/h
0.425				
	3911 0.92 1063 8 0 1.5 1.2 0.962 1.00 4421	3911 572 0.92 0.92 1063 155 8 9 0 0 1.5 1.5 1.2 1.2 0.962 0.957 1.00 1.00 4421 650	3911         572         2299           0.92         0.92         0.92           1063         155         625           8         9         10           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.962         0.957         0.952           1.00         1.00         1.00           4421         650         2624	3911         572         2299         0           0.92         0.92         0.92         0.92           1063         155         625         0           8         9         10         0           0         0         0         0           1.5         1.5         1.5         1.5           1.2         1.2         1.2         1.2           0.962         0.957         0.952         1.000           1.00         1.00         1.00         1.00           4421         650         2624         0

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>w</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>	1926	
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





Wea	aving and N	Non-Weavi	ng Speeds_	
Weaving intensity factor, W Average weaving speed, $S_W$ Average non-weaving speed, $S_N$	w		mi/h mi/h	
Weaving Segmen	t Speed, De	ensity, Lev	el of Service	e and Capacity
Weaving segment speed, S Weaving segment density, D Level of service, LOS Weaving segment v/c ratio Weaving segment flow rate, v Weaving segment capacity, C <sub>W</sub>		F 1.364 7400 5424	mi/h pc/mi/ln pc/h veh/h	
Lim If limit reached, see note.	nitations on	Weaving S	Segments	
Weaving length (ft)	Min 300	Max 6968 Max 2350	Actual 2150 Analyzed 1981 Analyzed	Note a, b c
v/c ratio		1.00	1.364	d
Notes: a. In weaving segments shorter make only necessary lane chab. Weaving segments longer that treated as isolated merge and Chapter 13, "Freeway Merge c. The density-based capacity example of the control of the c	inges. In the calcudiverge are and Diverge and Control of the cont	lated maxing the segment capacity of	mum length e procedure s."	should be s of way segment,

d. Volumes exceed the weaving segment capacity. The level of service is F.







#### HCS 2010: Freeway Weaving Release 6.1

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E-mail: ramini@olssonassociates.com

Operational Analysis

Analyst: RA

Agency/Co.: Olsson Associates Date Performed: 5/11/2015 Analysis Time Period: AM Peak Hour

Freeway/Dir. of Travel: I-35 C-D Rd. Northbound

Between On Ramp from SE Service Rd. to Off Ramp to I-240 Eastbound Weaving Location:

2040 [EXISTING CONFIGURATION] Analysis Year: I-35\_I-240 Interchange Traffic Operation Description:

Inputs\_

C-D Roadway / Multilane Highways Segment Type Weaving configuration One-Sided

Number of lanes, N 2 Weaving segment length, Ls 825 ft Freeway free-flow speed, FFS 35 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2250 pc/h/ln Terrain type Level Grade 0.00 %

Length 0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components

	$V_{\mathrm{FF}}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	1651	153	978	38	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	449	42	266	10	
Trucks and buses	10	2	16	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.990	0.926	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1884	168	1148	42	pc/h
Volume ratio, VR	0.406				_

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1316	lc/h
Weaving lane changes, LC <sub>w</sub>	1402	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	318	
Non-weaving lane change, LC <sub>NW</sub>	459	lc/h
Total lane changes, LC <sub>ALL</sub>	1861	lc/h





	Weaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W		0.429		
Average weaving speed, S <sub>w</sub>		29.0	mi/h	
Average non-weaving speed,	$S_{NW}$	17.7	mi/h	
Weaving Segn	nent Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		21.1	mi/h	
Weaving segment density, D		77.0	pc/mi/ln	
Level of service, LOS		E	_	
Weaving segment v/c ratio		0.902		
Weaving segment flow rate, v	/	3088	pc/h	
Weaving segment capacity, C	w	3423	veh/h	
]	Limitations	on Weaving	Segments	
If limit reached, see note.		S	·	
	Min	Max	Actual	Note
Weaving length (ft)	300	6748	825	a, b
		Max	Analyzed	
Density-based capacity, $C_{IWL}$ (pc/h/ln)		2250	1797	c
		Max	Analyzed	
v/c ratio		1.00	0.902	d

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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E-mail: ramini@olssonassociates.com

\_Operational Analysis\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour

Freeway/Dir. of Travel: I-35 C-D Rd. Northbound

Weaving Location: Between On Ramp from SE Service Rd. to Off Ramp to I-240 Eastbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Grade 0.00 %
Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	1588	203	711	51	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	432	55	193	14	
Trucks and buses	10	2	16	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.990	0.926	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1812	223	835	56	pc/h
Volume ratio, VR	0.362				

2	ln
2.00	int/mi
1	lc/pc
1	lc/pc
	lc/pc
1058	lc/h
1144	lc/h
308	
447	lc/h
1591	lc/h
	2.00 1 1 1058 1144 308 447





Weaving and Non-Weaving Speeds						
Weaving intensity factor, W		0.379				
Average weaving speed, S <sub>w</sub>		29.5	mi/h			
Average non-weaving speed	$S_{NW}$	20.4	mi/h			
Weaving Segment Speed, Density, Level of Service and Capacity						
Weaving segment speed, S		22.9	mi/h			
Weaving segment density, D		63.8	pc/mi/ln			
Level of service, LOS		E	•			
Weaving segment v/c ratio		0.797				
Weaving segment flow rate,	v	2787	pc/h			
Weaving segment capacity,		3495	veh/h			
	Limitations	on Weaving	Segments			
If limit reached, see note.		8				
	Min	Max	Actual	Note		
Weaving length (ft)	300	6254	825	a, b		
		Max	Analyzed	,		
Density-based capacity,		2250	1835	c		
C <sub>IWL</sub> (pc/h/ln)						
· · · · · · · · · · · · · · · · · · ·		Max	Analyzed			
v/c ratio		1.00	0.797	d		
N						

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is  ${\sf F}$ .





#### HCS 2010: Freeway Weaving Release 6.1

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E-mail: ramini@olssonassociates.com

Operational Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour

Freeway/Dir. of Travel: I-35 C-D Rd. Northbound

Weaving Location: Between On Ramp from I-240 Eastbound to Off Ramp to I-240 Westbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35 I-240 Interchange Traffic Operation

Inputs\_

Conversion to pc/h Under Base Conditions

Volume Components

 $V_{FF}$  $V_{RF}$  $V_{\text{FR}}$  $V_{RR}$ Volume, V 0 veh/h 153 1207 1651 Peak hour factor, PHF 0.92 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 42 328 449 0 Trucks and buses 6 11 Recreational vehicles 0 0 0 0 % Trucks and buses PCE, ET 1.5 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.971 0.948 0.971 1.000 Driver population adjustment, fP 1.00 1.00 1.00 1.00 Flow rate, v 171 1384 1848 0 pc/h 0.950 Volume ratio, VR

Configuration Characteristics\_\_\_

Number of maneuver lanes, NWL 2.00 Interchange density, ID int/mi Minimum RF lane changes, LC<sub>RF</sub> 1 lc/pc Minimum FR lane changes, LCFR lc/pc Minimum RR lane changes, LC<sub>RR</sub> lc/pc Minimum weaving lane changes, LC<sub>MIN</sub> lc/h Weaving lane changes, LCw lc/h Non-weaving vehicle index, I<sub>NW</sub> 20 lc/h Non-weaving lane change, LC<sub>NW</sub> lc/hTotal lane changes, LC<sub>ALL</sub>





Weaving and Non-Weaving Speeds					
Weaving intensity factor, W					
Average weaving speed, S <sub>w</sub>			mi/h		
Average non-weaving speed, S	NW		mi/h		
Weaving Segme	ent Speed,	Density, Lev	vel of Service	e and Capacity	
Weaving segment speed, S			mi/h		
Weaving segment density, D			pc/mi/ln		
Level of service, LOS		F	1		
Weaving segment v/c ratio		1.364			
Weaving segment flow rate, v		3304	pc/h		
Weaving segment capacity, Cv	V	2423	veh/h		
Li	mitations of	on Weaving	Segments		
If limit reached, see note.			~		
	Min	Max	Actual	Note	
Weaving length (ft)	300	13539	440	a, b	
		Max	Analyzed	-, -	
Density-based capacity,		2250	1248	c	
C <sub>IWL</sub> (pc/h/ln)					
-1,12 (1 )		Max	Analyzed		
v/c ratio		1.00	1.364	d	
Notes: a. In weaving segments shorte make only necessary lane c b. Weaving segments longer t treated as isolated merge an Chapter 13, "Freeway Merg c. The density-based capacity under equivalent ideal conditions are considered."	hanges. han the cale d diverge a ge and Dive exceeds th	culated max areas using t erge Segmen	imum length he procedure ts."	should be s of	

d. Volumes exceed the weaving segment capacity. The level of service is F.







### HCS 2010: Freeway Weaving Release 6.1

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E-mail: ramini@olssonassociates.com

Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour

Freeway/Dir. of Travel: I-35 C-D Rd. Northbound

Weaving Location: Between On Ramp from I-240 Eastbound to Off Ramp to I-240 Westbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Segment Type C-D Roadway / Multilane Highways
Weaving configuration One-Sided
Number of lanes, N 2 ln

Number of ranks, N  $\frac{2}{100}$  in Weaving segment length, L<sub>S</sub>  $\frac{440}{100}$  ft Freeway free-flow speed, FFS  $\frac{35}{100}$  mi/h Minimum segment speed, S<sub>MIN</sub>  $\frac{15}{100}$  mi/h Freeway maximum capacity, C<sub>IFL</sub>  $\frac{2250}{100}$  pc/h/ln Terrain type

Grade 0.00 %
Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{ ext{FF}}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	203	1143	1588	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	55	311	432	0	
Trucks and buses	6	11	6	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.948	0.971	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	227	1311	1778	0	pc/h
Volume ratio, VR	0.932				•

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>w</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>	20	
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





v	/eaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W				
Average weaving speed, S <sub>w</sub>			mi/h	
Average non-weaving speed,	$S_{NW}$		mi/h	
Weaving Segm	ent Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D			pc/mi/ln	
Level of service, LOS		F	1	
Weaving segment v/c ratio		1.309		
Weaving segment flow rate, v		3220	pc/h	
Weaving segment capacity, C		2460	veh/h	
L	imitations	on Weaving	Segments	
If limit reached, see note.		J	·	
	Min	Max	Actual	Note
Weaving length (ft)	300	13291	440	a, b
6 6 ()		Max	Analyzed	
Density-based capacity,		2250	1267	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	1.309	d
Notes:				
a. In weaving segments shorted make only necessary lane of		ft, weaving	vehicles are a	assumed to
b. Weaving segments longer t		aulated may	imum lanath	should be
treated as isolated merge at				
				5 01
Chapter 13, "Freeway Merge and Diverge Segments."				

c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.







### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Weaving Location: Between On Ramp from I-240 Westbound to Off Ramp to SE 66th Street

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 400 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{\mathrm{FF}}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	4172	1821	229	152	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1134	495	62	41	
Trucks and buses	7	11	1	1	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.948	0.995	0.995	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4694	2088	250	166	pc/h
Volume ratio, VR	0.325				-

Configuration Characteristics\_

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	2338	lc/h
Weaving lane changes, LC <sub>w</sub>	2488	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	389	
Non-weaving lane change, LC <sub>NW</sub>	448	lc/h
Total lane changes, LC <sub>ALL</sub>	2936	lc/h





	_Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W	r	1.089		
Average weaving speed, Sw		38.9	mi/h	
Average non-weaving speed	$I, S_{NW}$	39.5	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		39.3	mi/h	
Weaving segment density, I	)	45.8	pc/mi/ln	
Level of service, LOS		E		
Weaving segment v/c ratio		0.974		
Weaving segment flow rate,	v	6955	pc/h	
Weaving segment capacity,	$C_{W}$	7139	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	_		_	
	Min	Max	Actual	Note
Weaving length (ft)	300	5852	400	a, b
, ,		Max	Analyzed	
Density-based capacity,		2350	1933	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.974	d
N-4				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Northbound

Weaving Location: Between On Ramp from I-240 Westbound to Off Ramp to SE 66th Street

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 400 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$ m V_{FR}$	$V_{RR}$	
4292	1588	191	127	veh/h
0.92	0.92	0.92	0.92	
1166	432	52	35	
7	11	1	1	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.966	0.948	0.995	0.995	
1.00	1.00	1.00	1.00	
4829	1821	209	139	pc/h
0.290				
	0.92 1166 7 0 1.5 1.2 0.966 1.00 4829	4292     1588       0.92     0.92       1166     432       7     11       0     0       1.5     1.5       1.2     1.2       0.966     0.948       1.00     1.00       4829     1821	4292     1588     191       0.92     0.92     0.92       1166     432     52       7     11     1       0     0     0       1.5     1.5     1.5       1.2     1.2     1.2       0.966     0.948     0.995       1.00     1.00     1.00       4829     1821     209	4292     1588     191     127       0.92     0.92     0.92     0.92       1166     432     52     35       7     11     1     1       0     0     0     0       1.5     1.5     1.5     1.5       1.2     1.2     1.2     1.2       0.966     0.948     0.995     0.995       1.00     1.00     1.00     1.00       4829     1821     209     139

Configuration Characteristics\_

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	2030	lc/h
Weaving lane changes, LC <sub>W</sub>	2180	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	397	
Non-weaving lane change, LC <sub>NW</sub>	470	lc/h
Total lane changes, LC <sub>ALL</sub>	2650	lc/h





	Weaving and	d Non-Weav	ving Speeds_	
Weaving intensity factor, W		1.005		
Average weaving speed, S <sub>w</sub>		39.9	mi/h	
Average non-weaving speed		42.0	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		41.4	mi/h	
Weaving segment density, I	)	42.3	pc/mi/ln	
Level of service, LOS		E		
Weaving segment v/c ratio		0.892		
Weaving segment flow rate,	v	6762	pc/h	
Weaving segment capacity,	$C_{\mathrm{W}}$	7583	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-	C	· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	5478	400	a, b
		Max	Analyzed	•
Density-based capacity,		2350	1962	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.892	d
N-4				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from SE 59th Street to Off Ramp to SE 66th Street

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 900 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
5728	254	318	0	veh/h
0.92	0.92	0.92	0.92	
1557	69	86	0	
8	5	1	0	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.962	0.976	0.995	1.000	
1.00	1.00	1.00	1.00	
6475	283	347	0	pc/h
0.089				
	0.92 1557 8 0 1.5 1.2 0.962 1.00 6475	5728         254           0.92         0.92           1557         69           8         5           0         0           1.5         1.5           1.2         1.2           0.962         0.976           1.00         1.00           6475         283	5728         254         318           0.92         0.92         0.92           1557         69         86           8         5         1           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.962         0.976         0.995           1.00         1.00         1.00           6475         283         347	5728         254         318         0           0.92         0.92         0.92         0.92           1557         69         86         0           8         5         1         0           0         0         0         0           1.5         1.5         1.5         1.5           1.2         1.2         1.2         1.2           0.962         0.976         0.995         1.000           1.00         1.00         1.00         1.00           6475         283         347         0

Configuration Characteristics\_

Number of maneuver lanes, NWL	2	ln	
Interchange density, ID	2.00	int/mi	
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc	
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc	
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc	
Minimum weaving lane changes, LC <sub>MIN</sub>	630	lc/h	
Weaving lane changes, LC <sub>W</sub>	998	lc/h	
Non-weaving vehicle index, I <sub>NW</sub>	1166		
Non-weaving lane change, LC <sub>NW</sub>	1051		lc/h
Total lane changes, LC <sub>ALL</sub>	2049	lc/h	





	_Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W	,	0.433		
Average weaving speed, Sw		49.9	mi/h	
Average non-weaving speed		51.9	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		51.8	mi/h	
Weaving segment density, I	)	34.3	pc/mi/ln	
Level of service, LOS		D	_	
Weaving segment v/c ratio		0.824		
Weaving segment flow rate,	v	6832	pc/h	
Weaving segment capacity,	$C_{W}$	8292	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	_	C	· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	3430	900	a, b
		Max	Analyzed	
Density-based capacity, C <sub>IWL</sub> (pc/h/ln)		2350	2156	c
•		Max	Analyzed	
v/c ratio		1.00	0.824	d

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from SE 59<sup>th</sup> Street to Off Ramp to SE 66<sup>th</sup> Street

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 900 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	5875	330	381	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1596	90	104	0	
Trucks and buses	8	5	1	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.976	0.995	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6641	368	416	0	pc/h
Volume ratio, VR	0.106				

\_Configuration Characteristics\_

Number of maneuver lanes, NWL	2	ln	
Interchange density, ID	2.00	int/mi	
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc	
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc	
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc	
Minimum weaving lane changes, LC <sub>MIN</sub>	784	lc/h	
Weaving lane changes, LC <sub>W</sub>	1152	lc/h	
Non-weaving vehicle index, I <sub>NW</sub>	1195		
Non-weaving lane change, LC <sub>NW</sub>	1085		lc/h
Total lane changes, LC <sub>ALL</sub>	2237	lc/h	





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.464		
Average weaving speed, Sw		49.2	mi/h	
Average non-weaving speed	, $S_{NW}$	50.4	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		50.3	mi/h	
Weaving segment density, I	)	36.9	pc/mi/ln	
Level of service, LOS		E		
Weaving segment v/c ratio		0.866		
Weaving segment flow rate,	$\mathbf{v}$	7140	pc/h	
Weaving segment capacity,	$C_{W}$	8246	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-		-	
	Min	Max	Actual	Note
Weaving length (ft)	300	3594	900	a, b
		Max	Analyzed	
Density-based capacity,		2350	2144	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.866	d
Notes:				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

Reza Amini, PE Olsson Associates

201 NW 63<sup>rd</sup> Street, Suite 130 Oklahoma City, OK 73116 Phone: (405) 242-6642 Fax: (405) 242-6601

E-mail: ramini@olssonassociates.com

Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from SE 66th Street to Off Ramp to I-240 Westbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Segment Type Freeway Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 565 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{\text{FR}}$	$V_{RR}$	
Volume, V	4712	127	1270	191	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1280	35	345	52	
Trucks and buses	7	1	12	1	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.995	0.943	0.995	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5301	139	1463	209	pc/h
Volume ratio, VR	0.225				

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1602	lc/h
Weaving lane changes, LC <sub>w</sub>	1847	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	623	
Non-weaving lane change, LC <sub>NW</sub>	671	lc/h
Total lane changes, LC <sub>ALL</sub>	2518	lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.735		
Average weaving speed, Sw		43.8	mi/h	
Average non-weaving speed	, $S_{NW}$	44.9	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		44.7	mi/h	
Weaving segment density, D	)	39.8	pc/mi/ln	
Level of service, LOS		E	_	
Weaving segment v/c ratio		0.878		
Weaving segment flow rate,	v	6872	pc/h	
Weaving segment capacity,	$C_{\mathbf{w}}$	7830	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	4796	565	a, b
		Max	Analyzed	
Density-based capacity,		2350	2026	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.878	d
N				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from SE 66th Street to Off Ramp to I-240 Westbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Segment Type Freeway Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 565 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{ ext{FF}}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	4592	152	1602	229	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1248	41	435	62	
Trucks and buses	7	1	12	1	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.995	0.943	0.995	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5166	166	1846	250	pc/h
Volume ratio, VR	0.271				•

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	2012	lc/h
Weaving lane changes, LC <sub>w</sub>	2257	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	612	
Non-weaving lane change, LC <sub>NW</sub>	652	lc/h
Total lane changes, LC <sub>ALL</sub>	2909	lc/h





	_Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W	•	0.823		
Average weaving speed, Sw		42.4	mi/h	
Average non-weaving speed		41.6	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		41.8	mi/h	
Weaving segment density, I	)	44.4	pc/mi/ln	
Level of service, LOS		E	-	
Weaving segment v/c ratio		0.933		
Weaving segment flow rate,	v	7177	pc/h	
Weaving segment capacity,	$C_{W}$	7691	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-		· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	5273	565	a, b
		Max	Analyzed	
Density-based capacity,		2350	1990	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.933	d
N-4				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour

Freeway/Dir. of Travel: I-35 C-D Rd. Southbound

Weaving Location: Between On Ramp from I-240 Westbound to Off Ramp to I-240 Eastbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Segment Type C-D Roadway / Multilane Highways
Weaving configuration One-Sided
Number of lanes, N 2 ln

Number of ranes, N 2 in Weaving segment length,  $L_{\rm S}$  400 ft Freeway free-flow speed, FFS 35 mi/h Minimum segment speed,  $S_{\rm MIN}$  15 mi/h Freeway maximum capacity,  $C_{\rm IFL}$  2250 pc/h/ln Terrain type Level

 Grade
 0.00
 %

 Length
 0.00
 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{ ext{FF}}$	$V_{ ext{RF}}$	$V_{FR}$	$V_{RR}$	
Volume, V	0	635	318	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	0	173	86	0	
Trucks and buses	0	14	22	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	1.000	0.935	0.901	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	739	384	0	pc/h
Volume ratio VR	1 000				-

Configuration Characteristics

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	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.524		
Average weaving speed, S <sub>w</sub>		28.1	mi/h	
Average non-weaving speed,	$S_{NW}$	24.2	mi/h	
Weaving Segn	nent Speed,	Density, Lev	vel of Service	e and Capacity
Weaving segment speed, S		28.1	mi/h	
Weaving segment density, D		20.0	pc/mi/ln	
Level of service, LOS		В	•	
Weaving segment v/c ratio		0.471		
Weaving segment flow rate, v	7	1123	pc/h	
Weaving segment capacity, C		2384	veh/h	
1	imitations	on Weaving	Segments	
If limit reached, see note.		on wearing		
	Min	Max	Actual	Note
Weaving length (ft)	300	14232	400	a, b
8 - 8 - (1)		Max	Analyzed	, -
Density-based capacity, C <sub>IWL</sub> (pc/h/ln)		2250	1192	c
CIWL (pc/11/111)		Max	Analyzed	
v/c ratio		1.00	0.471	d
v/C fatio		1.00	0.4/1	u
NT 4				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is  ${\sf F}$ .





### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis

Analyst: RA

Agency/Co.: Olsson Associates Date Performed: 5/11/2015 Analysis Time Period: PM Peak Hour

Freeway/Dir. of Travel: I-35 C-D Rd. Southbound

Weaving Location: Between On Ramp from I-240 Westbound to Off Ramp to I-240 Eastbound

2040 [EXISTING CONFIGURATION] Analysis Year: Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

C-D Roadway / Multilane Highways Segment Type Weaving configuration One-Sided

Number of lanes, N 400 Weaving segment length, L<sub>S</sub> ft Freeway free-flow speed, FFS mi/h 35 Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2250 pc/h/ln Terrain type Level Grade 0.00 %

Length 0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components

 $V_{FF}$  $V_{RF}$  $V_{\text{FR}}$  $V_{RR}$ Volume, V 953 0 0 veh/h 381 Peak hour factor, PHF 0.92 0.92 0.92 0.92 Peak 15-min volume, V<sub>15</sub> 0 259 104 0 Trucks and buses 0 14 22 Recreational vehicles 0 0 0 0 % Trucks and buses PCE, ET 1.5 1.5 1.5 1.5 Recreational vehicle PCE, ER 1.2 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 1.000 0.935 0.901 1.000 Driver population adjustment, fP 1.00 1.00 1.00 1.00 Flow rate, v 1108 460 0 pc/h 1.000 Volume ratio, VR

Configuration Characteristics

Number of maneuver lanes, NWL 2.00 Interchange density, ID int/mi Minimum RF lane changes, LC<sub>RF</sub> 1 lc/pc Minimum FR lane changes, LCFR lc/pc Minimum RR lane changes, LC<sub>RR</sub> lc/pc Minimum weaving lane changes, LC<sub>MIN</sub> 1568 lc/h Weaving lane changes, LCw 1606 lc/h Non-weaving vehicle index, I<sub>NW</sub> 0 lc/h Non-weaving lane change, LC<sub>NW</sub> 0 Total lane changes, LCALL 1606 lc/h





	_Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.677		
Average weaving speed, Sw		26.9	mi/h	
Average non-weaving speed		19.9	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		26.9	mi/h	
Weaving segment density, I	)	29.1	pc/mi/ln	
Level of service, LOS		C	•	
Weaving segment v/c ratio		0.658		
Weaving segment flow rate,	v	1568	pc/h	
Weaving segment capacity,	$C_{W}$	2384	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-		· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	14232	400	a, b
		Max	Analyzed	
Density-based capacity,		2250	1192	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.658	d
N-4				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





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E-mail: ramini@olssonassociates.com

Operational Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from I-240 Eastbound to Off Ramp to SE 82<sup>nd</sup> Street

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35 I-240 Interchange Traffic Operation

Inputs\_

Segment Type Freeway Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 675 ft Freeway free-flow speed, FFS mi/h 65 Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, C<sub>IFL</sub> pc/h/ln 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
4750	2058	89	165	veh/h
0.92	0.92	0.92	0.92	
1291	559	24	45	
7	9	3	2	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.966	0.957	0.985	0.990	
1.00	1.00	1.00	1.00	
5344	2338	98	181	pc/h
0.306				
	4750 0.92 1291 7 0 1.5 1.2 0.966 1.00 5344	4750     2058       0.92     0.92       1291     559       7     9       0     0       1.5     1.5       1.2     0.966       0.957     1.00       5344     2338	4750     2058     89       0.92     0.92     0.92       1291     559     24       7     9     3       0     0     0       1.5     1.5     1.5       1.2     1.2     1.2       0.966     0.957     0.985       1.00     1.00     1.00       5344     2338     98	4750         2058         89         165           0.92         0.92         0.92         0.92           1291         559         24         45           7         9         3         2           0         0         0         0           1.5         1.5         1.5         1.5           1.2         1.2         1.2         1.2           0.966         0.957         0.985         0.990           1.00         1.00         1.00         5344         2338         98         181

Configuration Characteristics\_\_\_\_

Number of maneuver lanes, NWL ln 2.00 Interchange density, ID int/mi Minimum RF lane changes, LC<sub>RF</sub> 1 lc/pc Minimum FR lane changes, LCFR lc/pc Minimum RR lane changes, LC<sub>RR</sub> lc/pc Minimum weaving lane changes, LC<sub>MIN</sub> lc/h Weaving lane changes, LCw lc/h Non-weaving vehicle index, I<sub>NW</sub> 697 Non-weaving lane change, LC<sub>NW</sub> lc/h Total lane changes, LCALL lc/h





We	aving and l	Non-Weavi	ng Speeds_	
Weaving intensity factor, W Average weaving speed, S <sub>W</sub>			mi/h	
Average non-weaving speed, S <sub>N</sub>	W		mi/h	
Weaving Segmen	nt Speed, D	ensity, Lev	el of Service	e and Capacity
Weaving segment speed, S Weaving segment density, D Level of service, LOS Weaving segment v/c ratio Weaving segment flow rate, v		F 1.015 7692	mi/h pc/mi/ln pc/h	
Weaving segment capacity, C <sub>W</sub>		7578	veh/h	
If limit reached, see note.	nitations on	Weaving S	Segments	
Weaving length (ft)  Density-based capacity,  C <sub>IWL</sub> (pc/h/ln)	Min 300	Max 5648 Max 2350	Actual 675 Analyzed 1970	Note a, b
v/c ratio		Max 1.00	Analyzed 1.015	d
Notes: a. In weaving segments shorter make only necessary lane chab. Weaving segments longer that treated as isolated merge and Chapter 13, "Freeway Merge c. The density-based capacity examples of the control of the	anges. In the calcudiverge are and Divergexceeds the	nlated maxineas using the Segment capacity of	mum length te procedure s."	should be s of way segment,

d. Volumes exceed the weaving segment capacity. The level of service is F.







### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from I-240 Eastbound to Off Ramp to SE 82<sup>nd</sup> Street

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 675 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	4664	2455	80	149	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1267	667	22	40	
Trucks and buses	7	9	3	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.957	0.985	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5247	2789	88	164	pc/h
Volume ratio. VR	0.347				•

Configuration Characteristics\_\_\_\_\_

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>W</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>	697	
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W				
Average weaving speed, S <sub>W</sub>			mi/h	
Average non-weaving speed,	$S_{NW}$		mi/h	
Weaving Segn	nent Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D			pc/mi/ln	
Level of service, LOS		F	•	
Weaving segment v/c ratio		1.199		
Weaving segment flow rate, v	1	8008	pc/h	
Weaving segment capacity, C	w	6680	veh/h	
1	imitations	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	6095	675	a, b
		Max	Analyzed	
Density-based capacity,		2350	1935	c
C <sub>IWL</sub> (pc/h/ln)				
,		Max	Analyzed	
v/c ratio		1.00	1.199	d
Notes:				
a. In weaving segments short	ter than 300	ft, weaving	vehicles are a	assumed to
make only necessary lane		, ,		
b. Weaving segments longer		culated max	imum length	should be
treated as isolated merge a				
Chapter 13, "Freeway Men	ge and Div	erge Segmer	nts."	

c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.



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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from Walker Ave. to Off Ramp to Santa Fe Ave.

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 500 ft Freeway free-flow speed, FFS 60 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2300 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
5872	573	699	0	veh/h
0.92	0.92	0.92	0.92	
1596	155	190	0	
6	2	2	2	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.971	0.990	0.990	0.990	
1.00	1.00	1.00	1.00	
6574	628	767	0	pc/h
0.175				
	5872 0.92 1596 6 0 1.5 1.2 0.971 1.00 6574	5872         573           0.92         0.92           1596         155           6         2           0         0           1.5         1.5           1.2         1.2           0.971         0.990           1.00         1.00           6574         628	5872         573         699           0.92         0.92         0.92           1596         155         190           6         2         2           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.971         0.990         0.990           1.00         1.00         1.00           6574         628         767	5872         573         699         0           0.92         0.92         0.92         0.92           1596         155         190         0           6         2         2         2           0         0         0         0           1.5         1.5         1.5         1.5           1.2         1.2         1.2         1.2           0.971         0.990         0.990         0.990           1.00         1.00         1.00         1.00           6574         628         767         0

\_Configuration Characteristics\_

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1395	lc/h
Weaving lane changes, LC <sub>w</sub>	1608	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	657	
Non-weaving lane change, LC <sub>NW</sub>	855	lc/h
Total lane changes, LC <sub>ALL</sub>	2463	lc/h





	_Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W	7	0.795		
Average weaving speed, Sw		40.1	mi/h	
Average non-weaving speed	$l, S_{NW}$	40.4	mi/h	
Weaving Seg	gment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		40.3	mi/h	
Weaving segment density, I	)	49.4	pc/mi/ln	
Level of service, LOS		E	_	
Weaving segment v/c ratio		0.991		
Weaving segment flow rate,	v	7969	pc/h	
Weaving segment capacity,	$C_{W}$	7810	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	_		_	
	Min	Max	Actual	Note
Weaving length (ft)	300	4283	500	a, b
		Max	Analyzed	
Density-based capacity,		2350	2011	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	l
		1.00	0.991	d

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

  b. Weaving segments longer than the calculated maximum length should be
- treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

Reza Amini, PE Olsson Associates

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Operational Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from Walker Ave. to Off Ramp to Santa Fe Ave.

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Segment Type Freeway Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 500 ft Freeway free-flow speed, FFS mi/h 60 Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, C<sub>IFL</sub> 2300 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components

$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
6261	635	826		veh/h
0.92	0.92	0.92	0.92	
1701	173	224	0	
6	2	2	2	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.971	0.990	0.990	0.990	
1.00	1.00	1.00	1.00	
7010	697	907	0	pc/h
0.186				
	6261 0.92 1701 6 0 1.5 1.2 0.971 1.00 7010	6261 635 0.92 0.92 1701 173 6 2 0 0 1.5 1.5 1.2 1.2 0.971 0.990 1.00 1.00 7010 697	6261         635         826           0.92         0.92         0.92           1701         173         224           6         2         2           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.971         0.990         0.990           1.00         1.00         1.00           7010         697         907	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

Configuration Characteristics\_

Number of maneuver lanes, NWL 2.00 Interchange density, ID int/mi Minimum RF lane changes, LC<sub>RF</sub> 1 lc/pc Minimum FR lane changes, LCFR lc/pc Minimum RR lane changes, LC<sub>RR</sub> lc/pc Minimum weaving lane changes, LC<sub>MIN</sub> lc/h Weaving lane changes, LC<sub>w</sub> lc/h Non-weaving vehicle index, I<sub>NW</sub> Non-weaving lane change, LC<sub>NW</sub> lc/h Total lane changes, LCALL lc/h





w	Veaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W				
Average weaving speed, S <sub>W</sub>			mi/h	
Average non-weaving speed, S	$S_{NW}$		mi/h	
Weaving Segm	ent Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D			pc/mi/ln	
Level of service, LOS		F	1	
Weaving segment v/c ratio		1.076		
Weaving segment flow rate, v		8614	pc/h	
Weaving segment capacity, Co	W	7775	veh/h	
L	imitations	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	4396	500	a, b
		Max	Analyzed	,
Density-based capacity,		2350	2002	c
$C_{IWL}$ (pc/h/ln)				
d		Max	Analyzed	
v/c ratio		1.00	1.076	d
Notes: a. In weaving segments shorter make only necessary lane of b. Weaving segments longer to treated as isolated merge are Chapter 13, "Freeway Mergor. The density-based capacity under equivalent ideal concepts."	hanges. han the cal nd diverge a ge and Dive exceeds th	culated max areas using t erge Segmen	imum length he procedure nts."	should be s of

d. Volumes exceed the weaving segment capacity. The level of service is F.







### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from Shields Blvd. to Off Ramp to I-35 Southbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, L<sub>S</sub> 1400 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
4200	356	1499	89	veh/h
0.92	0.92	0.92	0.92	
1141	97	407	24	
6	1	6	1	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.971	0.995	0.971	0.995	
1.00	1.00	1.00	1.00	
4702	389	1678	97	pc/h
0.303				
	4200 0.92 1141 6 0 1.5 1.2 0.971 1.00 4702	4200 356 0.92 0.92 1141 97 6 1 0 0 1.5 1.5 1.2 1.2 0.971 0.995 1.00 1.00 4702 389	4200     356     1499       0.92     0.92     0.92       1141     97     407       6     1     6       0     0     0       1.5     1.5     1.5       1.2     1.2     1.2       0.971     0.995     0.971       1.00     1.00     1.00       4702     389     1678	4200     356     1499     89       0.92     0.92     0.92     0.92       1141     97     407     24       6     1     6     1       0     0     0     0       1.5     1.5     1.5       1.2     1.2     1.2       0.971     0.995     0.971     0.995       1.00     1.00     1.00     1.00       4702     389     1678     97

\_Configuration Characteristics\_

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>w</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>	1369	
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





w	/eaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W Average weaving speed, S <sub>W</sub>			mi/h	
Average non-weaving speed, S	$S_{ m NW}$		mi/h	
Weaving Segm	ent Speed,	Density, Lev	vel of Service	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D			pc/mi/ln	
Level of service, LOS		F	1	
Weaving segment v/c ratio		1.128		
Weaving segment flow rate, v		6667	pc/h	
Weaving segment capacity, Co	W	5910	veh/h	
L	imitations (	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	5595	1400	a, b
		Max	Analyzed	
Density-based capacity,		2350	2029	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	1.128	d
Notes: a. In weaving segments shorter make only necessary lane of b. Weaving segments longer to treated as isolated merge at Chapter 13, "Freeway Mergor. The density-based capacity under equivalent ideal concepts."	hanges. han the cal nd diverge a ge and Dive exceeds th	culated max areas using t erge Segmen	imum length he procedure ts."	should be s of

d. Volumes exceed the weaving segment capacity. The level of service is F.







### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from Shields Blvd. to Off Ramp to I-35 Southbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 1400 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{\mathrm{FF}}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	4536	458	1537	114	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1233	124	418	31	
Trucks and buses	6	1	6	1	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.995	0.971	0.995	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5078	500	1721	125	pc/h
Volume ratio VR	0.299				•

\_Configuration Characteristics\_\_

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>w</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>	1369	
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W				
Average weaving speed, S <sub>W</sub>			mi/h	
Average non-weaving speed,	$S_{NW} \\$		mi/h	
Weaving Segr	nent Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D			pc/mi/ln	
Level of service, LOS		F	•	
Weaving segment v/c ratio		1.218		
Weaving segment flow rate,	v	7208	pc/h	
Weaving segment capacity, C	Cw	5916	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	5575	1400	a, b
		Max	Analyzed	, -
Density-based capacity,		2350	2031	c
C <sub>IWL</sub> (pc/h/ln)				
2 d		Max	Analyzed	
v/c ratio		1.00	1.218	d
Notes:				
a. In weaving segments shor	ter than 300	ft. weaving	vehicles are a	assumed to
make only necessary lane		,		
b. Weaving segments longer		culated max	imum length	should be
treated as isolated merge a				
Chapter 13, "Freeway Me	_	_	1	

c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.



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### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from I-35 Southbound to Off Ramp to I-35 Northbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 500 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	3349	318	1207	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	910	86	328	0	
Trucks and buses	6	22	11	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.901	0.948	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3749	384	1384	0	pc/h
Volume ratio, VR	0.320				

Configuration Characteristics\_

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1768	lc/h
Weaving lane changes, LC <sub>W</sub>	1888	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	375	
Non-weaving lane change, LC <sub>NW</sub>	465	lc/h
Total lane changes, LC <sub>ALL</sub>	2353	lc/h





	Weaving and	d Non-Weav	ving Speeds_	
Weaving intensity factor, W		0.767		
Average weaving speed, S <sub>w</sub>		43.3	mi/h	
Average non-weaving speed	, $S_{NW}$	43.4	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		43.4	mi/h	
Weaving segment density, I	)	42.4	pc/mi/ln	
Level of service, LOS		E	•	
Weaving segment v/c ratio		0.946		
Weaving segment flow rate,	v	5357	pc/h	
Weaving segment capacity,	$C_{W}$	5662	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-	٥	· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	5804	500	a, b
		Max	Analyzed	ŕ
Density-based capacity,		2350	1944	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	1
v/c ratio		1.00	0.946	d
NY .				

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from I-35 Southbound to Off Ramp to I-35 Northbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35 I-240 Interchange Traffic Operation

\_Inputs\_

Segment Type Freeway Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, L<sub>S</sub> 500 ft Freeway free-flow speed, FFS mi/h 65 Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, C<sub>IFL</sub> 2350 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	3851	381	1143	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1046	104	311	0	
Trucks and buses	6	22	11	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.901	0.948	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4311	460	1311	0	pc/h
Volume ratio, VR	0.291				

Configuration Characteristics\_

Number of maneuver lanes, NWL 2.00 Interchange density, ID int/mi Minimum RF lane changes, LC<sub>RF</sub> 1 lc/pc Minimum FR lane changes, LCFR lc/pc Minimum RR lane changes, LC<sub>RR</sub> lc/pc Minimum weaving lane changes, LC<sub>MIN</sub> lc/h Weaving lane changes, LCw lc/h Non-weaving vehicle index, I<sub>NW</sub> 375 Non-weaving lane change, LC<sub>NW</sub> lc/h Total lane changes, LCALL lc/h





	Weaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W				
Average weaving speed, S <sub>W</sub>			mi/h	
Average non-weaving speed,	$S_{NW}$		mi/h	
Weaving Segr	nent Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D			pc/mi/ln	
Level of service, LOS		F	•	
Weaving segment v/c ratio		1.030		
Weaving segment flow rate,	V	5905	pc/h	
Weaving segment capacity, C	Cw .	5732	veh/h	
]	Limitations	on Weaving	Segments	
If limit reached, see note.		8		
	Min	Max	Actual	Note
Weaving length (ft)	300	5549	500	a, b
		Max	Analyzed	
Density-based capacity,		2350	1968	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	1.030	d
Notes: a. In weaving segments shor make only necessary lane b. Weaving segments longer treated as isolated merge a Chapter 13, "Freeway Mec. The density-based capacity under equivalent ideal control of the control of	changes. than the cal and diverge a rge and Dive y exceeds th	culated max areas using t erge Segmer ee capacity o	imum length he procedure its."	should be s of way segment,

d. Volumes exceed the weaving segment capacity. The level of service is F.







### HCS 2010: Freeway Weaving Release 6.1

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\_Operational Analysis\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from I-35 Northbound to Off Ramp to Pole Rd.

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 1500 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	3461	904	206	112	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	940	246	56	30	
Trucks and buses	6	16	2	7	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.926	0.990	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3875	1061	226	126	pc/h
Volume ratio, VR	0.243				

Configuration Characteristics\_

Number of maneuver lanes, NWL	2	ln	
Interchange density, ID	2.00	int/mi	
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc	
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc	
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc	
Minimum weaving lane changes, LC <sub>MIN</sub>	1287	lc/h	
Weaving lane changes, LC <sub>w</sub>	1580	lc/h	
Non-weaving vehicle index, I <sub>NW</sub>	1200		
Non-weaving lane change, LC <sub>NW</sub>	1059		lc/h
Total lane changes, LC <sub>ALL</sub>	2639	lc/h	





Weaving intensity factor, W		0.353		
Average weaving speed, S <sub>W</sub>		52.0	mi/h	
Average non-weaving speed, $S_{NW}$		47.3	mi/h	
Weaving Seg	gment Speed,	Density, Le	vel of Service	and Capacity
Weaving segment speed, S		48.3	mi/h	
Weaving segment density, D		36.5	pc/mi/ln	
Level of service, LOS		E	-	
Weaving segment v/c ratio		0.846		
Weaving segment flow rate, v		5134	pc/h	
Weaving segment capacity, C <sub>W</sub>		6067	veh/h	
	_Limitations	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	4985	1500	a, b
		Max	Analyzed	
Density-based capacity,		2350	2083	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.846	d
Notes:				
a. In weaving segments sho make only necessary lan		ft, weaving	vehicles are a	assumed to

- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
  c. The density-based capacity exceeds the capacity of a basic freeway segment,
- under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from I-35 Northbound to Off Ramp to Pole Rd.

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, L<sub>S</sub> 1500 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	3861	561	371	201	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1049	152	101	55	
Trucks and buses	6	16	2	7	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.926	0.990	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4323	659	407	226	pc/h
Volume ratio, VR	0.190				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	1066	lc/h
Weaving lane changes, LC <sub>W</sub>	1359	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	1365	
Non-weaving lane change, LC <sub>NW</sub>	1325	lc/h
Total lane changes, LC <sub>ALL</sub>	2684	lc/h





	Weaving an	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.358		
Average weaving speed, Sw		51.8	mi/h	
Average non-weaving speed	$S_{NW}$	48.3	mi/h	
Weaving Segr	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		49.0	mi/h	
Weaving segment density, D		38.2	pc/mi/ln	
Level of service, LOS		E	_	
Weaving segment v/c ratio		0.880		
Weaving segment flow rate,	v	5452	pc/h	
Weaving segment capacity, of	$C_{\mathbf{W}}$	6192	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	4433	1500	a, b
		Max	Analyzed	
Density-based capacity,		2350	2126	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.880	d
Notes:				
a. In weaving segments shor make only necessary lane		ft, weaving	vehicles are a	assumed to

- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
  c. The density-based capacity exceeds the capacity of a basic freeway segment,
- under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

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#### Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from Pole Rd. to Off Ramp to I-35 C-D Rd. Northbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

### Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 1700 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

### \_Conversion to pc/h Under Base Conditions

#### Volume Components

	$V_{ ext{FF}}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	2667	216	661	38	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	725	59	180	10	
Trucks and buses	7	2	11	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.990	0.948	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3000	237	758	42	pc/h
Volume ratio, VR	0.246				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>	995	lc/h
Weaving lane changes, LC <sub>w</sub>	1311	lc/h
Non-weaving vehicle index, I <sub>NW</sub>	1034	
Non-weaving lane change, LC <sub>NW</sub>	970	lc/h
Total lane changes, LC <sub>ALL</sub>	2281	lc/h





	_Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W	V	0.285		
Average weaving speed, Sw	Į.	53.9	mi/h	
Average non-weaving speed	$d$ , $S_{NW}$	51.4	mi/h	
Weaving Se	gment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		52.0	mi/h	
Weaving segment density, I	D	25.9	pc/mi/ln	
Level of service, LOS		C	•	
Weaving segment v/c ratio		0.642		
Weaving segment flow rate	, v	3901	pc/h	
Weaving segment capacity,	$C_{\mathrm{W}}$	6075	veh/h	
	_Limitations	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	5017	1700	a, b
		Max	Analyzed	
Density-based capacity,		2350	2096	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.642	d
Notes:				
a. In weaving segments sho	orter than 300	ft, weaving	vehicles are a	assumed to
make only necessary lan				
h Weaving segments long	er than the cal	culated may	imum length	should be

- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
  c. The density-based capacity exceeds the capacity of a basic freeway segment,
- under equivalent ideal conditions.
  d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from Pole Rd. to Off Ramp to I-35 C-D Rd. Northbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 1700 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
3395	487	398	85	veh/h
0.92	0.92	0.92	0.92	
923	132	108	23	
7	2	11	2	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.966	0.990	0.948	0.990	
1.00	1.00	1.00	1.00	
3819	535	456	93	pc/h
0.202				
	3395 0.92 923 7 0 1.5 1.2 0.966 1.00 3819	3395     487       0.92     0.92       923     132       7     2       0     0       1.5     1.5       1.2     1.2       0.966     0.990       1.00     1.00       3819     535	3395     487     398       0.92     0.92     0.92       923     132     108       7     2     11       0     0     0       1.5     1.5     1.5       1.2     1.2     1.2       0.966     0.990     0.948       1.00     1.00     1.00       3819     535     456	3395     487     398     85       0.92     0.92     0.92     0.92       923     132     108     23       7     2     11     2       0     0     0     0       1.5     1.5     1.5     1.5       1.2     1.2     1.2     1.2       0.966     0.990     0.948     0.990       1.00     1.00     1.00     3819     535       456     93

Number of maneuver lanes, NWL	2	ln	
Interchange density, ID	2.00	int/mi	
Minimum RF lane changes, LC <sub>RF</sub>	1	lc/pc	
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc	
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc	
Minimum weaving lane changes, LC <sub>MIN</sub>	991	lc/h	
Weaving lane changes, LC <sub>w</sub>	1307	lc/h	
Non-weaving vehicle index, I <sub>NW</sub>	1330		
Non-weaving lane change, LC <sub>NW</sub>	1215		lc/h
Total lane changes, LC <sub>ALL</sub>	2522	lc/h	





Weaving intensity factor, W		0.309		
Average weaving speed, S <sub>W</sub>		53.2	mi/h	
Average non-weaving speed,	$S_{NW}$	50.0	mi/h	
Weaving Segn	nent Speed,	Density, Le	vel of Service	and Capacity
Weaving segment speed, S		50.6	mi/h	
Weaving segment density, D		32.3	pc/mi/ln	
Level of service, LOS		D		
Weaving segment v/c ratio		0.767		
Weaving segment flow rate, v	7	4738	pc/h	
Weaving segment capacity, C	w	6177	veh/h	
If limit reached, see note.	Limitations	on Weaving	Segments	
	Min	Max	Actual	Note
Weaving length (ft)	300	4558	1700	a, b
		Max	Analyzed	
Density-based capacity,		2350	2131	c
$C_{IWL}$ (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.767	d

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
  c. The density-based capacity exceeds the capacity of a basic freeway segment,
- under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from I-35 C-D Rd. Northbound to Off Ramp to I-35 C-D Rd. Southbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 540 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

eh/h
Ď
Ď
c/h

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>w</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>	283	
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





Weaving and Non-Weaving Speeds						
Weaving intensity factor, W						
Average weaving speed, Sw			mi/h			
Average non-weaving speed,	$S_{NW}$		mi/h			
Weaving Segm	ent Speed,	Density, Lev	vel of Service	and Capacity		
Weaving segment speed, S			mi/h			
Weaving segment density, D			pc/mi/ln			
Level of service, LOS		F	•			
Weaving segment v/c ratio		1.078				
Weaving segment flow rate, v		4943	pc/h			
Weaving segment capacity, C	W	4586	veh/h			
Ι	imitations of	on Weaving	Segments			
If limit reached, see note.			·			
	Min	Max	Actual	Note		
Weaving length (ft)	300	7893	540	a, b		
		Max	Analyzed			
Density-based capacity,		2350	1787	c		
C <sub>IWL</sub> (pc/h/ln)						
		Max	Analyzed			
v/c ratio		1.00	1.078	d		
Notes:						
a. In weaving segments short	er than 300	ft, weaving	vehicles are a	assumed to		
make only necessary lane of		., 8				
b. Weaving segments longer	than the cal	culated max	imum length	should be		
treated as isolated merge as	nd diverge a	areas using t	he procedure	s of		
Chapter 13, "Freeway Mer	ge and Dive	erge Segmen	ıts."			
c. The density-based capacity		e capacity of	f a basic freev	way segment,		
under equivalent ideal con						
d. Volumes exceed the weaving segment capacity. The level of service is F.						



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### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from I-35 C-D Rd. Northbound to Off Ramp to I-35 C-D Rd. Southbound

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 540 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2350 pc/h/ln Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions

Volume Components

	$V_{\rm FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	2929	1588	953	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	796	432	259	0	
Trucks and buses	7	6	14	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.971	0.935	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3295	1778	1108	0	pc/h
Volume ratio VR	0.467				1

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>w</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>	283	
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





v	Veaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W				
Average weaving speed, S <sub>W</sub>			mi/h	
Average non-weaving speed,	$S_{NW}$		mi/h	
Weaving Segm	ent Speed,	Density, Lev	vel of Service	and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D			pc/mi/ln	
Level of service, LOS		F	•	
Weaving segment v/c ratio		1.203		
Weaving segment flow rate, v		5972	pc/h	
Weaving segment capacity, C	W	4966	veh/h	
I	imitations	on Weaving	Segments	
If limit reached, see note.		Č	·	
	Min	Max	Actual	Note
Weaving length (ft)	300	7442	540	a, b
5 5 7		Max	Analyzed	
Density-based capacity,		2300	1822	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	1.203	d
Notes:				
a. In weaving segments shorte	er than 300	ft. weaving	vehicles are a	assumed to
make only necessary lane of		,		
b. Weaving segments longer	_	culated max	imum length	should be
treated as isolated merge ar	nd diverge	areas using t	he procedure	s of
Chapter 13, "Freeway Mer	ge and Dive	erge Segmen	ıts."	
c. The density-based capacity	exceeds th	e capacity of	f a basic freev	way segment,
under equivalent ideal cond				
d. Volumes exceed the weaving segment capacity. The level of service is F.				







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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from I-35 Southbound to Off Ramp to Shields Blvd.

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 1560 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
3609	988	290	155	veh/h
0.92	0.92	0.92	0.92	
981	268	79	42	
7	10	1	1	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.966	0.952	0.995	0.995	
1.00	1.00	1.00	1.00	
4060	1128	317	169	pc/h
0.255				
	0.92 981 7 0 1.5 1.2 0.966 1.00 4060	3609     988       0.92     0.92       981     268       7     10       0     0       1.5     1.5       1.2     1.2       0.966     0.952       1.00     1.00       4060     1128	3609         988         290           0.92         0.92         0.92           981         268         79           7         10         1           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.966         0.952         0.995           1.00         1.00         1.00           4060         1128         317	3609         988         290         155           0.92         0.92         0.92         0.92           981         268         79         42           7         10         1         1           0         0         0         0           1.5         1.5         1.5         1.5           1.2         1.2         1.2         1.2           0.966         0.952         0.995         0.995           1.00         1.00         1.00         4060         1128         317         169

Number of maneuver lanes, NWL	2	ln	
Interchange density, ID	2.00	int/mi	
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc	
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc	
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc	
Minimum weaving lane changes, LC <sub>MIN</sub>	317	lc/h	
Weaving lane changes, LC <sub>W</sub>	617	lc/h	
Non-weaving vehicle index, I <sub>NW</sub>	1319		
Non-weaving lane change, LC <sub>NW</sub>	1184		lc/h
Total lane changes, LC <sub>ALL</sub>	1801	lc/h	





Weaving intensity factor, W		0.253		
2 ,			:/I-	
Average weaving speed, S <sub>W</sub>	C	54.9	mi/h	
Average non-weaving speed,	$S_{NW}$	53.6	mi/h	
Weaving Segr	nent Speed,	Density, Le	vel of Servic	ce and Capacity
Weaving segment speed, S		54.0	mi/h	
Weaving segment density, D		35.1+	pc/mi/ln	
Level of service, LOS		Е	F	
Weaving segment v/c ratio		0.910		
Weaving segment flow rate,	v	5483	pc/h	
Weaving segment capacity, (	Cw	6026	veh/h	
If limit reached, see note.	Limitations	on Weaving	Segments_	
,	Min	Max	Actual	Note
Weaving length (ft)	300	5103	1560	a, b
weaving length (it)	300	Max	Analyzed	
Density-based capacity,		2350	2079	c
C <sub>IWL</sub> (pc/h/ln)		2330	2017	C
CIWL (PC/II/III)		Max	Analyze	d
v/c ratio		1.00	0.910	d d
V/C Tatio		1.00	0.510	u

- make only necessary lane changes.
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
  c. The density-based capacity exceeds the capacity of a basic freeway segment,
- under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from I-35 Southbound to Off Ramp to Shields Blvd.

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N 3 ln Weaving segment length, Ls 1560 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{\mathrm{FF}}$	$ m V_{RF}$	$V_{21}$	$ m V_{RR}$	
Volume, V	4104	1239	413	222	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1115	337	112	60	
Trucks and buses	7	10	1	1	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.966	0.952	0.995	0.995	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4617	1414	451	243	pc/h
Volume ratio, VR	0.277				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	0	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>w</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>	1493	
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





v	Veaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W				
Average weaving speed, Sw			mi/h	
Average non-weaving speed,	$S_{NW}$		mi/h	
Weaving Segm	ent Speed,	Density, Le	vel of Service	and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D			pc/mi/ln	
Level of service, LOS		F	1	
Weaving segment v/c ratio		1.088		
Weaving segment flow rate, v		6498	pc/h	
Weaving segment capacity, C	W	5974	veh/h	
Ι	imitations of	on Weaving	Segments	
If limit reached, see note.			·	
	Min	Max	Actual	Note
Weaving length (ft)	300	5342	1560	a, b
		Max	Analyzed	
Density-based capacity,		2350	2061	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	1.088	d
Notes:				
a. In weaving segments short	er than 300	ft, weaving	vehicles are a	assumed to
make only necessary lane of		, 8		
b. Weaving segments longer	than the cal	culated max	imum length	should be
treated as isolated merge as	nd diverge a	areas using t	he procedure	s of
Chapter 13, "Freeway Mer	ge and Dive	erge Segmen	ıts."	
c. The density-based capacity		e capacity o	f a basic freev	way segment,
under equivalent ideal cond				t to the
d. Volumes exceed the weaving segment capacity. The level of service is F.				



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**ACCESS JUSTIFICATION REPORT** 



### HCS 2010: Freeway Weaving Release 6.1

Reza Amini, PE Olsson Associates

201 NW 63<sup>rd</sup> Street, Suite 130 Oklahoma City, OK 73116 Phone: (405) 242-6642 Fax: (405) 242-6601

E-mail: ramini@olssonassociates.com

Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from Santa Fe Ave. to Off Ramp to Walker Ave.

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 450 ft Freeway free-flow speed, FFS 60 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2300 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
4890	762	648	0	veh/h
0.92	0.92	0.92	0.92	
1329	207	176	0	
6	2	2	2	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.971	0.990	0.990	0.990	
1.00	1.00	1.00	1.00	
5475	837	711	0	pc/h
0.220				
	0.92 1329 6 0 1.5 1.2 0.971 1.00 5475	4890     762       0.92     0.92       1329     207       6     2       0     0       1.5     1.5       1.2     1.2       0.971     0.990       1.00     1.00       5475     837	4890     762     648       0.92     0.92     0.92       1329     207     176       6     2     2       0     0     0       1.5     1.5     1.5       1.2     1.2     1.2       0.971     0.990     0.990       1.00     1.00     1.00       5475     837     711	4890     762     648     0       0.92     0.92     0.92     0.92       1329     207     176     0       6     2     2     2       0     0     0     0       1.5     1.5     1.5     1.5       1.2     1.2     1.2     1.2       0.971     0.990     0.990     0.990       1.00     1.00     1.00     5475     837

Number of maneuver lanes, NWL	2	ln	
Interchange density, ID	2.00	int/mi	
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc	
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc	
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc	
Minimum weaving lane changes, LC <sub>MIN</sub>	1548	lc/h	
Weaving lane changes, LC <sub>W</sub>	1732	lc/h	
Non-weaving vehicle index, I <sub>NW</sub>	493		
Non-weaving lane change, LC <sub>NW</sub>	601		lc/h
Total lane changes, LC <sub>ALL</sub>	2333	lc/h	





	_Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.828		
Average weaving speed, Sw		39.6	mi/h	
Average non-weaving speed	, $S_{NW}$	40.4	mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		40.2	mi/h	
Weaving segment density, I	)	43.6	pc/mi/ln	
Level of service, LOS		E	•	
Weaving segment v/c ratio		0.891		
Weaving segment flow rate,	v	7023	pc/h	
Weaving segment capacity,		7654	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-			
	Min	Max	Actual	Note
Weaving length (ft)	300	4746	450	a, b
		Max	Analyzed	
Density-based capacity,		2300	1971	c
C <sub>IWL</sub> (pc/h/ln)				
-		Max	Analyzed	
v/c ratio		1.00	0.891	d
NI.				

### Notes:

- a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.b. Weaving segments longer than the calculated maximum length should be
- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
- c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
- d. Volumes exceed the weaving segment capacity. The level of service is F.





#### HCS 2010: Freeway Weaving Release 6.1

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Fax: (405) 242-6601 E-mail: ramini@olssonassociates.com

Operational Analysis\_\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/11/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from Santa Fe Ave. to Off Ramp to Walker Ave.

Analysis Year: 2040 [EXISTING CONFIGURATION]
Description: I-35 I-240 Interchange Traffic Operation

Inputs

Segment Type Freeway Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>s</sub> 450 ft Freeway free-flow speed, FFS 60 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h Freeway maximum capacity, CIFL 2300 pc/h/ln Terrain type Level Grade 0.00% 0.00 Length mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{21}$	$V_{RR}$	
Volume, V	5486	826	787	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1491	224	214	0	
Trucks and buses	6	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6142	907	864	0	pc/h
Volume ratio, VR	0.224				-

Configuration Characteristics

Number of maneuver lanes, NWL 2 ln Interchange density, ID 2.00 int/mi Minimum RF lane changes, LC<sub>RF</sub> 0 lc/pc Minimum FR lane changes, LCFR 1 lc/pc Minimum RR lane changes, LC<sub>RR</sub> lc/pc Minimum weaving lane changes, LC<sub>MIN</sub> lc/h Weaving lane changes, LCw lc/h Non-weaving vehicle index, I<sub>NW</sub> Non-weaving lane change, LC<sub>NW</sub> lc/h Total lane changes, LCALL lc/h





We	aving and N	Non-Weavi	ng Speeds_	
Weaving intensity factor, W Average weaving speed, S <sub>W</sub>			mi/h	
Average non-weaving speed, S <sub>N</sub>	W		mi/h	
Weaving Segmen	it Speed, De	ensity, Leve	el of Service	e and Capacity
Weaving segment speed, S	• ,	•	mi/h	1 7
Weaving segment density, D			pc/mi/ln	
Level of service, LOS		F	P ********	
Weaving segment v/c ratio		1.005		
Weaving segment flow rate, v		7913	pc/h	
Weaving segment capacity, $C_{\text{W}}$		7647	veh/h	
Lim	nitations on	Weaving S	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	4781	450	a, b
weaving length (it)	300	Max	Analyzed	u, 0
Density-based capacity,		2300	1969	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	1.005	d
Notes: a. In weaving segments shorter make only necessary lane chab. Weaving segments longer that treated as isolated merge and Chapter 13, "Freeway Merge c. The density-based capacity evander equivalent ideal conditions."	anges. In the calcudiverge are and Diverge are	lated maxing the segment	mum length e procedure s."	should be s of

d. Volumes exceed the weaving segment capacity. The level of service is F.







### HCS 2010: Freeway Weaving Release 6.1

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\_Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/12/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from SE 59<sup>th</sup> Street to Off Ramp to SE 66<sup>th</sup> Street

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 900 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{ m FF}$	$ m V_{RF}$	$ m V_{FR}$	$ m V_{RR}$	
Volume, V	5691	599	355	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1546	163	96	0	
Trucks and buses	8	5	1	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.976	0.995	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6433	667	388	0	pc/h
Volume ratio, VR	0.141				

Number of maneuver lanes, NWL	2	ln	
Interchange density, ID	2.00	int/mi	
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc	
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc	
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc	
Minimum weaving lane changes, LC <sub>MIN</sub>	1055	lc/h	
Weaving lane changes, LC <sub>W</sub>	1423	lc/h	
Non-weaving vehicle index, I <sub>NW</sub>	1158		
Non-weaving lane change, LC <sub>NW</sub>	1043		lc/h
Total lane changes, LC <sub>ALL</sub>	2466	lc/h	





	_Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W	7	0.501		
Average weaving speed, Sw		48.3	mi/h	
Average non-weaving speed	$l, S_{NW}$	48.4	mi/h	
Weaving Seg	gment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S		48.4	mi/h	
Weaving segment density, I	)	38.7	pc/mi/ln	
Level of service, LOS		E	_	
Weaving segment v/c ratio		0.884		
Weaving segment flow rate	, <b>v</b>	7488	pc/h	
Weaving segment capacity,	$C_{W}$	8142	veh/h	
	_Limitations	on Weaving	Segments	
If limit reached, see note.				
	Min	Max	Actual	Note
Weaving length (ft)	300	3941	900	a, b
		Max	Analyzed	
Density-based capacity,		2350	2117	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	l
v/c ratio		1.00	0.884	d
Notes:				
<ul> <li>In weaving segments sho make only necessary lan</li> </ul>		ft, weaving	vehicles are	assumed to
h Weaving segments longe		culated max	imum length	should be

- b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
  c. The density-based capacity exceeds the capacity of a basic freeway segment,
- under equivalent ideal conditions.
  d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/12/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-35 Southbound

Weaving Location: Between On Ramp from SE 59<sup>th</sup> Street to Off Ramp to SE 66<sup>th</sup> Street

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, Ls 900 ft Freeway free-flow speed, FFS 65 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2350 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	5773	859	460	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1569	233	125	0	
Trucks and buses	8	5	1	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.962	0.976	0.995	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6526	957	503	0	pc/h
Volume ratio, VR	0.183				

Number of maneuver lanes, NWL	2	ln	
Interchange density, ID	2.00	int/mi	
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc	
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc	
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc	
Minimum weaving lane changes, LC <sub>MIN</sub>	1460	lc/h	
Weaving lane changes, LC <sub>W</sub>	1828	lc/h	
Non-weaving vehicle index, I <sub>NW</sub>	1175		
Non-weaving lane change, LC <sub>NW</sub>	1062		lc/h
Total lane changes, LC <sub>ALL</sub>	2890	lc/h	





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W		0.567		
Average weaving speed, S <sub>W</sub>		46.9	mi/h	
Average non-weaving speed,	$S_{\rm NW}$	44.9	mi/h	
Weaving Segn	nent Speed,	Density, Lev	vel of Service	e and Capacity
Weaving segment speed, S		45.3	mi/h	
Weaving segment density, D		44.1	pc/mi/ln	
Level of service, LOS		E	1	
Weaving segment v/c ratio		0.958		
Weaving segment flow rate, v	V	7986	pc/h	
Weaving segment capacity, C	W	8019	veh/h	
If limit reached, see note.	Limitations	on Weaving	Segments	
	Min	Max	Actual	Note
Weaving length (ft)	300	4361	900	a, b
		Max	Analyzed	
Density-based capacity,		2350	2085	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	0.958	d
Notes: a. In weaving segments short make only necessary lane b. Weaving segments longer treated as isolated merge a Chapter 13, "Freeway Met. The density-based capacity."	changes. than the cal and diverge a rge and Dive	culated max areas using t erge Segmen	imum length he procedure ts."	should be s of



under equivalent ideal conditions.

d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

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\_Operational Analysis\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/12/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from Walker Ave. to Off Ramp to Santa Fe Ave.

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 500 ft Freeway free-flow speed, FFS 60 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2300 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
5080	572	1461	0	veh/h
0.92	0.92	0.92	0.92	
1380	155	397	0	
6	2	2	2	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.971	0.990	0.990	0.990	
1.00	1.00	1.00	1.00	
5687	628	1604	0	pc/h
0.282				
	5080 0.92 1380 6 0 1.5 1.2 0.971 1.00 5687	5080         572           0.92         0.92           1380         155           6         2           0         0           1.5         1.5           1.2         1.2           0.971         0.990           1.00         1.00           5687         628	5080         572         1461           0.92         0.92         0.92           1380         155         397           6         2         2           0         0         0           1.5         1.5         1.5           1.2         1.2         1.2           0.971         0.990         0.990           1.00         1.00         1.00           5687         628         1604	5080         572         1461         0           0.92         0.92         0.92         0.92           1380         155         397         0           6         2         2         2           0         0         0         0           1.5         1.5         1.5         1.5           1.2         1.2         1.2         1.2           0.971         0.990         0.990         0.990           1.00         1.00         1.00         1.00           5687         628         1604         0

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>w</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>		
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





	Weaving and	d Non-Weav	ving Speeds_	
Weaving intensity factor, W				
Average weaving speed, Sw			mi/h	
Average non-weaving speed	, $S_{NW}$		mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D	)		pc/mi/ln	
Level of service, LOS		F	_	
Weaving segment v/c ratio		1.028		
Weaving segment flow rate,	$\mathbf{v}$	7919	pc/h	
Weaving segment capacity,	$C_{W}$	7480	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-		_	
	Min	Max	Actual	Note
Weaving length (ft)	300	5390	500	a, b
		Max	Analyzed	
Density-based capacity,		2300	1926	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	1.028	d
Notes:				
a. In weaving segments show		ft, weaving	vehicles are	assumed to
make only necessary lane				
b. Weaving segments longer				
treated as isolated merge				S OI
Chapter 13, "Freeway Me	_	~ ~		
c. The density-based capaci	ty exceeds th	e capacity o	t a basic free	way segment,

under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.







### HCS 2010: Freeway Weaving Release 6.1

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Operational Analysis\_\_\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/12/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Eastbound

Weaving Location: Between On Ramp from Walker Ave. to Off Ramp to Santa Fe Ave.

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 500 ft Freeway free-flow speed, FFS 60 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2300 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

veh/h
%
%
pc/h

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>w</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>		
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





	Weaving and	d Non-Weav	ring Speeds_	
Weaving intensity factor, W				
Average weaving speed, S <sub>W</sub>			mi/h	
Average non-weaving speed	, $S_{NW}$		mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Servic	ce and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D	)		pc/mi/ln	
Level of service, LOS		F	•	
Weaving segment v/c ratio		1.126		
Weaving segment flow rate,	v	8593	pc/h	
Weaving segment capacity,	$C_{\mathbf{w}}$	7406	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.		S	С _	
	Min	Max	Actual	Note
Weaving length (ft)	300	5638	500	a, b
		Max	Analyzed	i
Density-based capacity,		2300	1907	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyze	d
v/c ratio		1.00	1.126	d
Notes:				
a. In weaving segments show make only necessary lane		ft, weaving	vehicles are	assumed to
b. Weaving segments longer		culated max	imum lengtl	h should be
treated as isolated merge				
Chapter 13, "Freeway Me				
c. The density-based capacit				eway segment,



under equivalent ideal conditions.

d. Volumes exceed the weaving segment capacity. The level of service is F.





### HCS 2010: Freeway Weaving Release 6.1

Reza Amini, PE Olsson Associates 201 NW 63<sup>rd</sup> Street, Suit

201 NW 63<sup>rd</sup> Street, Suite 130 Oklahoma City, OK 73116 Phone: (405) 242-6642 Fax: (405) 242-6601

E-mail: ramini@olssonassociates.com

#### \_Operational Analysis\_\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/12/2015
Analysis Time Period: AM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from Santa Fe Ave. to Off Ramp to Walker Ave.

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

### Inputs\_

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, L <sub>S</sub>	450	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, S <sub>MIN</sub>	15	mi/h
Freeway maximum capacity, C <sub>IFL</sub>	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

### \_Conversion to pc/h Under Base Conditions\_

### Volume Components

Volume, V       3987       1665       648       0       veh/h         Peak hour factor, PHF       0.92       0.92       0.92       0.92         Peak 15 min volume V       1082       452       176       0		$ m V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
,	Volume, V	3987	1665	648	0	veh/h
Peak 15 min volume V 1092 452 176 0	Peak hour factor, PHF	0.92	0.92	0.92	0.92	
reak 13-11111 volume, V <sub>15</sub> 1083 432 170 0	Peak 15-min volume, V <sub>15</sub>	1083	452	176	0	
Trucks and buses 6 2 2 2 %	Trucks and buses	6	2	2	2	%
Recreational vehicles 0 0 0 %	Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET 1.5 1.5 1.5	Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER 1.2 1.2 1.2 1.2	Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV 0.971 0.990 0.990 0.990	Heavy vehicle adjustment, fHV	0.971	0.990	0.990	0.990	
Driver population adjustment, fP 1.00 1.00 1.00 1.00	Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v 4464 1828 711 0 pc/h	Flow rate, v	4464	1828	711	0	pc/h
Volume ratio, VR 0.363	Volume ratio, VR	0.363				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/m
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>W</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>		
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





	Weaving and	d Non-Weav	ving Speeds_	
Weaving intensity factor, W				
Average weaving speed, Sw			mi/h	
Average non-weaving speed	, $S_{NW}$		mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Service	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D	)		pc/mi/ln	
Level of service, LOS		F	•	
Weaving segment v/c ratio		1.058		
Weaving segment flow rate,	$\mathbf{v}$	7003	pc/h	
Weaving segment capacity,	$C_{\mathrm{W}}$	6427	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-	C	· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	6265	450	a, b
		Max	Analyzed	
Density-based capacity,		2300	1855	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzed	
v/c ratio		1.00	1.058	d
Notes:				
a. In weaving segments show		ft, weaving	vehicles are a	assumed to
make only necessary lane		1.4.1		1 . 111 .
b. Weaving segments longer				
treated as isolated merge Chapter 13, "Freeway Me				8 01
1 , ,	_	~ ~		
c. The density-based capaci	ıy exceeas th	е сарасиу о	i a basic iree	way segment,

under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.







### HCS 2010: Freeway Weaving Release 6.1

Reza Amini, PE Olsson Associates

201 NW 63<sup>rd</sup> Street, Suite 130 Oklahoma City, OK 73116 Phone: (405) 242-6642 Fax: (405) 242-6601

E-mail: ramini@olssonassociates.com

Operational Analysis\_

Analyst: RA

Agency/Co.: Olsson Associates
Date Performed: 5/12/2015
Analysis Time Period: PM Peak Hour
Freeway/Dir. of Travel: I-240 Westbound

Weaving Location: Between On Ramp from Santa Fe Ave. to Off Ramp to Walker Ave.

Analysis Year: 2040 [PROPOSED DESIGN]

Description: I-35\_I-240 Interchange Traffic Operation

Inputs\_

Freeway Segment Type Weaving configuration One-Sided Number of lanes, N ln Weaving segment length, L<sub>S</sub> 450 ft Freeway free-flow speed, FFS 60 mi/h Minimum segment speed, S<sub>MIN</sub> 15 mi/h pc/h/ln Freeway maximum capacity, CIFL 2300 Terrain type Level Grade 0.00 % Length 0.00 mi

\_Conversion to pc/h Under Base Conditions\_

Volume Components

	$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$	
Volume, V	4597	1715	787	0	veh/h
Peak hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, V <sub>15</sub>	1249	466	214	0	
Trucks and buses	6	2	2	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5147	1883	864	0	pc/h
Volume ratio, VR	0.348				

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	2.00	int/mi
Minimum RF lane changes, LC <sub>RF</sub>	0	lc/pc
Minimum FR lane changes, LC <sub>FR</sub>	1	lc/pc
Minimum RR lane changes, LC <sub>RR</sub>		lc/pc
Minimum weaving lane changes, LC <sub>MIN</sub>		lc/h
Weaving lane changes, LC <sub>w</sub>		lc/h
Non-weaving vehicle index, I <sub>NW</sub>		
Non-weaving lane change, LC <sub>NW</sub>		lc/h
Total lane changes, LC <sub>ALL</sub>		lc/h





	Weaving and	d Non-Weav	ing Speeds_	
Weaving intensity factor, W				
Average weaving speed, Sw			mi/h	
Average non-weaving speed	, $S_{NW}$		mi/h	
Weaving Seg	ment Speed,	Density, Le	vel of Servic	e and Capacity
Weaving segment speed, S			mi/h	
Weaving segment density, D	)		pc/mi/ln	
Level of service, LOS		F		
Weaving segment v/c ratio		1.145		
Weaving segment flow rate,	$\mathbf{v}$	7894	pc/h	
Weaving segment capacity,	$C_{\mathrm{W}}$	6696	veh/h	
	Limitations	on Weaving	Segments	
If limit reached, see note.	-	C	· _	
	Min	Max	Actual	Note
Weaving length (ft)	300	6104	450	a, b
		Max	Analyzed	
Density-based capacity,		2300	1867	c
C <sub>IWL</sub> (pc/h/ln)				
		Max	Analyzeo	i
v/c ratio		1.00	1.145	d
Notes:				
a. In weaving segments show make only necessary lane		ft, weaving	vehicles are	assumed to
b. Weaving segments longer		culated max	imum length	should be
treated as isolated merge				
Chapter 13, "Freeway Me				05 01
c. The density-based capaci				eway segment
c. The density-based capaci	ıy exceeus th	е сарасиу о	i a dasic free	way segment,

under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.



OLSSON ®





### APPENDIX D

Solicitation Responses and Written Comments from the Public Meeting

MARY FALLIN GOVERNOR

TODD LAMB LIEUTENANT GOVERNOR



TREY LAM EXECUTIVE DIRECTOR

LISA KNAUF OWEN ASSISTANT DIRECTOR

June 8, 2015

Dawn Sullivan
Environmental Programs Division Engineer
Oklahoma Department of Transportation
200 NE 21st Street
Oklahoma City, OK 73105-3204



RE: Solicitation for input for the I-35/I-240 Interchange Reconstruction in Oklahoma County, Oklahoma

Dear Ms. Sullivan:

Thank you for the opportunity to review this proposed project area as described in your letter of May 20, 2015. The project area includes the I-35/I-240 interchange.

The project area has been reviewed using the Soil Survey of Oklahoma County. Hydric soils are not indicated on the soil survey map, indicating that these areas most likely do not contain wetland ecosystems and that your project should not significantly impact wetland resources in the area. If you believe this determination to be inaccurate, an on-site investigation may be needed. This investigation needs to be coordinated with the U.S. Army Corps of Engineers, Regulatory Branch, in Tulsa. Their address and phone number is:

U.S. Army Corps of Engineers Mr. Andy Commer Chief of Regulatory Branch 1645 South 101st East Avenue Tulsa, OK 74128-4629 918/669-7400

Based on our wetlands determination criteria there should be no significant impact on wetland resources in the area described. If you have any further questions or concerns, please contact me at 405/522-6908.

Sincerely,

**Brooks Tramell** 

Wetlands Program Coordinator

Brooke & Liamell

Water Quality Division

cc: Wetlands file



RECEIVED
JUN 10 2015
ENVIRONMENTAL
PROGRAMS DIV.

### **OKLAHOMA WATER RESOURCES BOARD**

Planning & Management Division Oklahoma City, OK

## **PUBLIC NOTICE REVIEW**

We have no comments to offer.	$\underline{X}$ We offer the following comments.

# WE RECOMMEND THAT YOU CONTACT THE LOCAL FLOODPLAIN ADMINISTRATOR FOR POSSIBLE PERMIT REQUIREMENTS FOR THIS

PROJECT. THE OWRB WEB SITE, <a href="www.owrb.ok.gov">www.owrb.ok.gov</a>, contains a directory of floodplain administrators and is located under forms/floodplain management/floodplain administrators, listed alphabetically by name of community. If this development would fall on STATE OWNED or operated property, a floodplain development permit is required from OWRB. The Chapter 55 Rules and permit application for this requirement can be found on the OWRB web site listed above. If this project is proposed in a non-participating community, try to ensure that this project is completed so that it is reasonably safe from flooding and so that it does not flood adjacent property if at all possible.

Reviewer: Cathy Poage, CFM Date: 06/04/2015

**Project Name:** Proposed I-35/I-240 Interchange Reconstruction, Located in Oklahoma City, OK

FIRM Name: ODOT, Dawn R Sullivan, PECC: Eric Wenger, FPA, OKC

\* Oklahoma City participates in the NFIP and has a floodplain development permitting system. Please see paragraph above.





### **David Saulsberry**

From: Siv Sundaram

**Sent:** Tuesday, July 14, 2015 10:52 AM

**To:** David Saulsberry

**Subject:** FW: Input for the I-35/I240 Interchange Reconstruction in Oklahoma County, Ok

Siv

----Original Message-----**From:** Dawn Sullivan

Sent: Sunday, July 05, 2015 07:57 PM Central Standard Time

**To:** Siv Sundaram

Subject: FW: Input for the I-35/I240 Interchange Reconstruction in Oklahoma County, Ok

Sent with Good (www.good.com)

----Original Message-----**From:** Eve Atkinson

Sent: Friday, June 26, 2015 04:54 PM Central Standard Time

To: Dawn Sullivan

Subject: Input for the I-35/I240 Interchange Reconstruction in Oklahoma County, Ok

Ms. Sullivan,

There are no LWCF projects in this area according to our data base. Thank you for the opportunity to review this project.

Eve L. Atkinson, Planner II Oklahoma Tourism and Recreation Department 120 North Robinson, Suite 600 Oklahoma City, OK 73102

405.230.8483. 405.230.8683 fax <u>Eve.Atkinson@travelok.com</u>



# **COMMENT FORM**

HTTP://WWW.ODOT.ORG/PUBLICMEETINGS

### PROPOSED I-35/I-240 IMPROVEMENTS

06/11/2015 Oklahoma County, OK

We would like to thank you for taking the time to attend this meeting and providing us with written comments. Putting your comments in writing is one of the most effective ways to have your concerns addressed.

PLEASE SUBMIT YOUR COMMENTS BY: 06/26/2015					
Name:	Business / Organization: CROSSR	OADS IN	DUSTRIAL PAR		
John W Meek	AMC/Hotels/Restaura	nt.			
Address:	City:	State:	Zip Code:		
3719 N Portland AVR	OKC	OK	73112		
Phone Number:	Email Address:	,			
405) 630-8155 / 405) 842-3599	John @ femi	oke. C	om		
"I have the following comment(s) or question(s) about the proposed impro Interchange to a multi-level interchange in Oklahoma County, OK."	vement project which includes the recor	struction of the	e existing I-35/I-240		
THE OVERALL DROJECT IS A GOOD design	Hard work very app	recinte	(,		
S. EASTERNION-OPERAMOS). THE SO	uth side flow works	well. Th	Reporthside		
RAMPS are to shape or stop too type	the turning radius	for TAR	BR TRAILERS		
pick-ups with trailers are way to tight		111	I.		
The increased two way trustices	jestion at these Not	thside 1	camp out		
off points at the service road june	tion will be a night	mare.	TRAFFIC		
east bound From the MALL and trail	I west lound from	the east	repro light		
intersection will both be in holding pa	Heen "at these Rampe	Pornts.	/		
THE Dublie uses the closest on toff	) Ramps for the MAL	Amc II	Tentles,		
college Resturants Regal Theother which	hwill become S. East	LERD & NO	oT the		
5# 59th tyen-around. FATURE Pl	ins for vacant landare	und the 1	Milleirele		
t pad sites within the Mall packing will ger	erate another 1000th	rntos cher	ing NEON,		
Evening and late wight on too of curre	It levels and MALL EX	Pandsion			
AT least the west Bound on BAMP:	should be included with	thin the	Phase 18		
construction Partiers upgrades	-				

Comments on this project can be submitted in several ways, including but not limited to:

By US Mail or Dropoff:

By Fax:

By Email:

On the Web:

OKLAHOMA DEPARTMENT OF TRANSPORTATION ENVIRONMENTAL PROGRAMS DIVISION

Fax: (405) 522-5193

environment@odot.org

www.odot.org/publicmeetings

200 N.E. 21ST ST. Oklahoma City, OK 73105-3204

Please be aware that all information that you submit on this form is subject to public disclosure under the Oklahoma Public Information Act.





# **COMMENT FORM**

HTTP://WWW.ODOT.ORG/PUBLICMEETINGS

### PROPOSED I-35/I-240 IMPROVEMENTS

06/11/2015 Oklahoma County, OK

We would like to thank you for taking the time to attend this meeting and providing us with written comments. Putting your comments in writing is one of the most effective ways to have your concerns addressed.

PLEASE SUBMIT YOUR COMMENTS BY: 06/26/2015					
Name:	Business / Organization:				
Address:	City:	State:	Zip Code:		
Phone Number:	Email Address:				
"I have the following comment(s) or question(s) about the proposed impro- Interchange to a multi-level interchange in Oklahoma County, OK."	vement project which includes the recon	struction of the	existing I-35/I-240		
interestange to a mata sever interestange in original accuracy, or					

Comments on this project can be submitted in several ways, including but not limited to:

By US Mail or Dropoff:
OKLAHOMA DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL PROGRAMS DIVISION

**By Fax:** Fax: (405) 522-5193

**By Email:** environment@odot.org

On the Web:

www.odot.org/publicmeetings

200 N.E. 21ST ST. Oklahoma City, OK 73105-3204

Please be aware that all information that you submit on this form is subject to public disclosure under the Oklahoma Public Information Act.





Mr. Mike Patterson Executive Director Oklahoma Department of Transportation 200 Northeast 21 Street Oklahoma City, OK 73105

Dear Mr. Patterson:

The South Oklahoma City Chamber of Commerce has the following concerns about the proposed changes to the I-35/I-240 interchange:

- For businesses and residents to the southeast of the I-35/I-240 interchange, emergency services in the area will be strained because of the permanent closures.
- We are highly disappointed in ODOT's level of communication with area businesses on how the changes to the intersection will affect them. The Chamber is concerned with the economic impact on local businesses, and so far, through communication and lack thereof from ODOT, it does not appear that ODOT has the same concerns as those in our business community and our residents.
- The current plans take the interchange to a D-level interchange. By the time these plans are implemented, the interchange will again be degraded, simply because the plans will be outdated and traffic will increase through the area. We need a plan that will take us up to a better interchange level.
- We strongly recommend that ODOT revisit the plans for the access from eastbound I-240 to southbound I-35. The current intersection is dangerous, but the revised plans do nothing to address the issue of the danger, congestion, and backup in the area.
- ODOT has not addressed concerns of the lack of funding for de-icing the planned fly-over bridges in the new plans for the

- There will be an increase in traffic volume on Santa Fe, Walker and Eastern. We are concerned that this will be hard on the existing roads, along with backup on I-240.
- The proposed access points to Plaza Mayor at the Crossroads are acceptable.

It is of the opinion of the South Oklahoma City Chamber of Commerce that the interchange of I-35 and I-240 need changes and upgrades. However, the current plans of ODOT not only endanger the safety of those who use these roads, but they also endanger the health and wellbeing of businesses and residents in the area. We ask ODOT to reconsider their plans, keeping in mind the above points.

Sincerely,

Paul Urquhart

Chairman of the Board

Elaine Lyons President

Elains Olyona

PC:

Senator Kyle Loveless

Senator Kay Floyd

Senator Jack Fry

Senator Ralph Shortey

Senator Rob Standridge

Senator Anthony Sykes

Representative Mike Christian

Representative Jon Echols

Representative Chris Kannady

Representative Mark McBride

Representative Richard Morrissette

Representative Shane Stone

Representative Paul Wesselhoft

Oklahoma City Councilman David Greenwell

Oklahoma City Councilman Pete White

### **David Saulsberry**

From: Daniel Nguyen

**Sent:** Thursday, June 04, 2015 10:36 AM

**To:** David Saulsberry

**Subject:** FW: I-35/I-240 interchange ODOT Meeting

### Here's your first comment

From: Vince Howie [mailto:vince.howie@yahoo.com]

Sent: Wednesday, June 03, 2015 7:54 PM

**To:** Chip Carter; Brenda Jones Barwick; Mike Rapella; Randy Kamp; Troy Humphrey; Pat Downes; Tom Gray; Robert Ruiz; John Griffin; Daniel Nguyen; Mark Vondrak; Myles Davidson; Pat Lewis; Debi Martin; Kristi Cole; Cathy O'Connor; Anna Fresonke; Joseph Echelle; Kevin Calabrese; Jim Blanchard; J Russell; Chris Goldsby; Kim Cooper-Hart; Paul Odom Jr; Brian Maughan; Walt Morris; Brian Griffin; Brad Smicklas; Peter Evans; Calib Hill; Paul David Odom; Lealon Taylor; Steve Bloomberg; David Greenwell; Jim Parrack; Joi Marcum; Frank Eskridge; John Mesa; Paul B. Odom III; Melissa Brodt; David Rudkin; Randy Entz; Mike Voorhees; Darrell McCallister; Brandi Johnson; Terry Howell; Nathaniel Harding; Rick Lowry; Rick Johnson; Harry Wilson; Sean Chillers; John Meek; Jonathan Heusel; Pete White; Rick Moore; Micah Campbell; George Dunlap; <a href="mailto:bkrieger@arvest.com">bkrieger@arvest.com</a>; Mike Milligan; Marci Puckett; <a href="mailto:elsocc@coxinet.net">elsocc@coxinet.net</a>; <a href="mailto:vanessarottmayer@southokc.com">vanessarottmayer@southokc.com</a>; Frakes Bob; Vince Howie; Brian Taylor; Brantley Hendrex; Johnson Brandi; Jon Dodson; Mark McKee; Kim Adkins; Fries Silver - Silver; Craig Smith

Subject: I-35/I-240 interchange ODOT Meeting

All,

We received a letter from ODOT stating that a meeting has been set to discuss the proposed changes to the I-35/I-240 interchange. The meeting is set for 6 p.m., Thursday, June 11, in the sanctuary of Wilmont Place Baptist Church, 6440 South Santa Fe, 73139. It is important that we have everyone attend this meeting, as we need all the support we can get to let ODOT know that this plan will be detrimental to many businesses along I-240, specifically those along Shields Boulevard.

The full letter is attached for your review.

If you have any questions, please let me know. I can be reached at (405) 634-1436.

### For South OKC Chamber Facebook:

We need your help, Chamber members. ODOT has set a meeting to discuss proposed changes to the I-35/I-240 interchange. This change will be detrimental to many people and businesses in South Oklahoma City, specifically those who use or do business along the Shields Boulevard exit on I-240, which will close with the planned changes. We need you to attend this meeting to help us let ODOT know that this plan will not work for the residents and business owners of South Oklahoma City. Join us at 6 p.m., Thursday, June 11, in the sanctuary of Ailment Place Baptist Church, 6440 South Santa Fe, 73139.

Everyone's voice counts! Please joins us and help us prevent the damage from happening.

### For Live South OKC Facebook:

We need your help, South Oklahoma City residents. ODOT has set a meeting to discuss proposed changes to the I-35/I-240 interchange. This change will be detrimental to many people in South Oklahoma City, specifically those who use the Shields Boulevard exit on I-240, which will close with the planned changes. We need you to attend this meeting to help us let ODOT know that this plan will not work for the residents and business owners of South Oklahoma City. Join us at 6 p.m., Thursday, June 11, in the sanctuary of Ailment Place Baptist Church, 6440 South Santa Fe, 73139.

Everyone's voice counts! Please joins us and help us prevent the damage from happening.

Elaine Lyons SOKC Chamber President